IV. ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES ANALYZED

A. INTRODUCTION

Chapter IV describes the effects on the human environment of the no action and proposed action alternatives described in Chapter II. Chapter III provides a detailed discussion on the affected environment of the study area and results of technical studies of environmental effects of mining, including MTM/VF operations. Technical information gathered for this EIS assists in delineating consequences and may also be a useful tool in the regulatory decision making process on a case-by-case basis. To give proper context to the discussion of consequences of the alternatives in this chapter, each section of this chapter sets out additional information on the consequences of MTM/VF activities.

The information on consequences of the alternatives includes the benefits of the alternatives, anticipated outcomes of proposed actions, and available information on the impacts of proposed activities regulated by the programs analyzed in this EIS. This programmatic EIS is necessarily broad given its purpose of addressing policies, guidance, and coordinated agency decision-making processes to minimize the adverse environmental effects from MTM/VF and the size and location of excess spoil disposal sites in valleys. The proposed actions and alternatives consist of many potential changes to data collection and analysis protocols, guidelines for best management practices, regulations, and mitigation requirements for MTM/VF operations. They are aimed at improving agency efficiency and effectiveness, increasing consistency within and between agencies, and meeting other public policies.

The proposed action alternatives are largely administrative and as a result, accurately projecting their environmental consequences is difficult. All three action alternatives share the goal of a better regulatory process and improved environmental protection. Therefore, projections of the positive and negative consequences of the action alternatives and the No Action Alternative must be made to compare the alternatives, even though accurately projecting impacts of administrative measures is difficult.

Environmental consequences can be categorized and presented in many ways, including the following:

- Direct effects of implementing an action
- Indirect effects, occurring in combination with other influences, that may occur at a later time or at some distance from the activity
- Short term or temporary effects
- Long-term or permanent effects
- Adverse effects
- Beneficial effects
- Cumulative effects
- Economic or social effects

This chapter discusses environmental consequences in these various ways.

1. Cumulative Effects

The Council on Environmental Quality (CEQ) regulations [40 CFR 1500-1508], implementing the procedural provisions of NEPA, define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions [40 CFR 1508.7]." "Actions," as used in CEQ regulations, may include a broad range of activities from those as specific as individual construction projects to those as general as implementing regulatory programs. Individual adverse impacts from an action may be insignificant individually, but may accumulate over time from one or more origins and collectively result in significant adverse impacts that degrade important natural resources. The cumulative impacts of a particular action can be viewed as the total effects on natural resources, socioeconomic resources, human health, recreation, quality of life aspects, and cultural and historical resources of that action and all other activities affecting those resources, compounding the effects of all actions over time.

The proposed actions and alternatives are broad in scope. As a result, this EIS is programmatic, addressing environmental consequences that are correspondingly broad in scope. Furthermore, none of the proposed actions or alternatives would be implemented in a vacuum. Implementation of the selected actions are interwoven with many other actions, events, and trends taking place at local, regional, national, and international levels.

For example, surface coal mining is not the only factor that affects vegetative cover in the study area. Land management practices, which include harvesting of timber and development for residential, recreational or commercial purposes, are also key considerations. The future of forest land in the eco-regions of the study area cannot be predicted by considering changes in surface coal mining reclamation alone.

Similarly, the CWA and SMCRA regulatory programs are not the only factors that affect coal mining and communities in the study area. Also of major importance are regional population loss or growth; changing demographics, lifestyles, property values, and alternate energy sources; economic competition and restructuring; and changing laws, policies, and practices implemented by other Federal and state agencies.

Population growth or decline and demographic changes in the study area will continue to transform communities in the study area. Communities that continue to lose population due to a lack of economic growth and diversification will further decline or be strained by decreases in employment opportunities in coal mining. However, communities that are positioned to sustain and promote economic growth through diversification will avoid a decline in growth. Demographic and land use changes might increase or decrease a community's tax base. Where economies are stable or growing, the tax base would likely be stable. Where populations continue to decline or mineral production significantly declines, the state and local tax revenues might decline.

The protection of Federally-listed species and their habitats can change the way mining activity is conducted. Future activities designed to avert habitat loss and endangered species listings will be implemented under any of the regulatory alternatives considered in this EIS.

A fundamental assumption of this analysis is that, with or without changes to the CWA and/or SMCRA regulatory programs for MTM/VF operations, the human environment within the study area will continue to change. The environmental regulatory programs for MTM/VF operations are but one factor in defining the future conditions of the human environment. The potential environmental consequences of the proposed actions and alternatives, including cumulative effects, are discussed by resource in this chapter. The surface mining of coal, including MTM/VF operations, is regulated by the laws and regulations discussed previously in Chapter II and Appendix B. None of these alternatives would reduce the effectiveness of the current regulatory programs described in Chapter II.

This EIS evaluated the cumulative effects of MTM/VF on various resources, socio-economics, and the human or natural environment in the following sections: Chapter III.N, Past and Current Mining in the Study Area; Chapter III.O, The Scope of Remaining Surface-Minable Coal in the Study Area; Appendix G, Post Mining Land Use Assessment--Mountaintop Mining in West Virginia, Mountaintop Technical Team Report, Phase I and II Economic Studies, Case Studies Report on Demographic Changes Related to Mountaintop Mining; Appendix I, Landscape Scale Cumulative Impact Study of Mountaintop Mining Operations and Figure III.O., The Extent of Potential Mountaintop Minable Coal.

2. Irreversible and Irretrievable Commitment of Resources

A resource is irreversibly committed when an action alters the resource so that it cannot be restored or returned to its original or pre-disturbance condition. A resource is irretrievably committed when it is removed or consumed. For example, in the surface mining of coal, the removal of coal would be an irreversible and irretrievable commitment of resources. While the coal would be irreversibly committed from the geologic formations, it is also irretrievably committed when burned for electrical generation.

Another example of irreversible loss involves native soil loss or erosion. Soil losses from handling, erosion losses from topsoil stockpiles, and other unavoidable erosion losses of native soils would be irreversible. CWA and SMCRA require that soil erosion and sedimentation be minimized and otherwise controlled to mitigate these effects to the maximum extent technologically feasible. Also, studies of reclaimed sites have shown that non-native mine soils, with time, become more like stable developed native soils.

The direct burial of stream segments by excess spoil for MTM/VF operations is a long-term irretrievable commitment of resources for the buried stream segment. However, the CWA and SMCRA provisions are designed to assure that adverse impacts to aquatic resources are minimized and that significant degradation of the downstream watershed does not occur from MTM/VF activities. Consequently, the effects of MTM/VF on aquatic resources are irreversible for a buried stream segment, but may produce varying levels of impact to the overall hydrologic regime depending on the watershed considered.

Impacts on terrestrial resources, such as forests and wildlife may be either permanent or temporary depending on the time frame considered. For instance, a mine site without reforestation as the post-mining land use may still result in a reversion to forestry through natural succession–despite the problems of excess compaction, lack of native seed sources across the reclaimed area, and other conditions hostile to reforestation. With sufficient time, although it may take hundreds of years, natural processes for mine soil improvement and succession can overcome conditions limiting reforestation, and the resource loss is not irreversible. Conversely, intensively managed reclaimed mine sites may never regain trees due to long-term use as industrial, residential, agricultural, or other non-forest uses. Reclamation techniques may exist to equal or exceed natural forest regeneration and productivity. In the cases where these techniques are applied, the loss of forest resource may be no less reversible than timbering; and in some cases productivity gains surpassing forestation on native soils. Reclamation of mine sites to forest conditions (commercial or otherwise) may not reestablish wildlife habitat to pre-mining conditions. While no program can dictate post-mining land uses, many programs encourage and promote the tangible benefits for return of mined land to forest conditions so as to minimize and mitigate adverse effects.

While loss of individuals of certain species within the mined areas may be irreversible, individuals of other species may be mobile enough to relocate to adjacent interior forest tracts. The adjacent forest tracts, which include their own resident populations, may or may not be able to support the additional populations due to competition for habitat. Again, the reclamation methods employed and post-mining land uses selected will determine whether or not the loss of wildlife resources is irreversible. Researchers have debated the benefits and detriments of forest edge habitat versus forest interior habitat, centered on the concept of biodiversity. Studies have shown that a post mining change in habitat can provide transitional habitat for declining grassland species uncommon to forested ecosystems. Accordingly, a shift in wildlife resource species may be temporary in nature, as with the vegetative cover, and provide arguments both for and against irreversible change–depending on the viewpoint of the observer.

Environmental controls on surface coal mining and reclamation may render some coal resources irretrievable. Avoiding and minimizing valley fill stream impacts could make portions of coal seams recoverable only by inefficient methods or not feasible to recover at all. However, these effects may be temporary for some coal resource blocks if different mining methods become feasible or the coal market makes it economical to mine the reserves in compliance with environmental controls. That is, rising energy prices or new technology might allow reclamation techniques that currently cannot be performed within profit margins. The loss of these reserves would not have an immediate, irreversible effect on energy production, because sufficient coal reserves exist elsewhere to meet current energy demands. However, long-term effects on energy production could occur, since rendering some Appalachian surface mining coal reserves unminable could ultimately hasten reserve depletion when other coal sources dwindle.

The level of future surface coal mining and reclamation operations under the proposed actions or alternatives would directly affect the magnitude of the irreversible and irretrievable commitment of resources. Provisions of the alternatives would also define the nature and extent of these commitments. These types of irreversible and irretrievable effects are discussed as part of the environmental consequences of the alternatives for resources susceptible to such effects.

B. AQUATIC RESOURCES

This section addresses the environmental consequences of MTM/VF associated with the alternatives as they affect the aquatic resources. These consequences include direct impacts such as the physical loss of streams and their associated biota, as well as indirect and cumulative impacts such as changes in water temperature, downstream chemistry and sediment transportation. This section discusses these direct and indirect impacts in the context of future conditions under the four alternatives.

Stream habitat and functions have been discussed in Chapter III.C.1 and the potential impacts to the streams from MTM/VF have been presented in Chapter III.D. Among the ecological functions of headwater streams are nutrient cycling and the maintenance of unique species and populations which provide a reservoir for genetic diversity in aquatic systems on a national basis. Changes in downstream thermal regimes, flow regimes, chemistry and sedimentation due to MTM/VF are discussed under the stream impairment issue in Chapter II.C. The impacts from MTM/VF, along with other disturbances such as road building, logging, and influx of residents, may result in a cumulative affect on aquatic resources within a watershed. A number of actions are proposed to standardize data collection, collect and analyze water quality and stream data, and develop a BMP manual for stream mitigation.

1. Consequences Common to the No Action Alternative and Alternatives 1, 2, and 3

a. Direct Stream Loss from MTM/VF

This section portrays consequences of past MTM/VF regarding loss of streams projected into the future using two measures: valley fill area and mining permit area. The amount of stream loss may differ with alternative selected, but stream loss will occur under all alternatives. Data on loss of linear miles of stream are available from the Cumulative Impact Study [Appendix I] and from the Fill Inventory [Chapter III.K.2]. The cumulative impact study estimated direct stream impacts based on the *permit boundary footprint* (including fills, mineral removal, roads, and incidental support areas), while the fill inventory estimated direct stream impact based only on *valley fill footprints*. Estimation of direct stream impacts based on the entire permit area footprint may overestimate actual direct impact, since not all of the area within the permit boundary is disturbed. Estimates of direct stream impacts based only on the valley fill footprint may underestimate actual direct impact because direct stream impact can occur in production and support areas.

MTM/VF impacts (including valley fills and other permit features) estimated in the Cumulative Impact Study (based on ten years, 1992-2002 of *permit* footprints) were 1,208 miles (2.05 %) of the 58,998 stream miles in the EIS study area. If that rate continued for another 10 years, a total of 4.10% would be impacted by 2013. [Appendix I] The following is a breakdown of stream impacts by *permit* footprint by state in the past ten years in the EIS study area. Kentucky had direct stream impacts of 730 miles (2.1%) of its EIS study area. Tennessee had direct stream impacts of 20 miles (0.4%) in the Tennessee portion of the study area. There were 151 miles (2.1%) of direct stream impacts in the Virginia portion of the study area. Direct impacts totaled 307 stream miles (2.6%) of the West Virginia portion of the study area.

The Fill Inventory calculated miles of streams under approved valley fill footprints in permits issued for the seventeen year period from 1985 to 2001. The total direct stream impact from *valley fill* footprints for the EIS study area for this period is 724 miles, or 1.2 % of the miles of streams within the study area [Chapter II.K.5 and Table IV.B-1]. If valley fill construction continued at this historical rate documented in the Fill Inventory for the next seventeen years (2003-2020), an additional 724 miles (for a total of 2.4%) could be impacted.

Table IV.B-1
Study Area Stream Miles Under Valley Fill Footprint

Year	KY	TN	VA	WV	Total
1985	26.98	0.22	4.60	21.02	52.82
1986	18.00	1.42	4.04	7.39	30.85
1987	32.07	0.51	2.22	1.66	36.46
1988	34.96	0.33	4.27	7.55	47.11
1989	20.81	0.00	4.32	11.66	36.79
1990	17.85	0.02	4.05	4.66	26.58
1991	26.60	0.65	5.16	10.73	43.14
1992	34.90	0.68	4.31	15.12	55.01
1993	26.30	0.00	4.50	11.31	41.81
1994	24.59	0.00	2.33	12.25	39.17
1995	36.83	0.00	3.46	21.58	61.87
1996	31.94	0.58	4.01	15.91	52.44
1997	28.99	0.43	3.00	15.58	84.00
1998	24.60	0.92	5.36	13.55	44.43
1999	25.19	0.31	4.06	19.90	49.46
2000	15.56	0.24	6.58	22.41	44.79
2001	10.19	0.00	1.09	1.73	13.09
Total	436.36	6.31	67.36	214.01	724.04

[Source: Valley Fill Inventory, Chapter III.K.2., Table K-8]

Studies show that while invertebrates and microbiota in headwater streams are only a minute fraction of living plant and animal biomass, they convert leaf litter to coarse and fine particulate organic matter. Scientific literature, for studies in states outside the EIS region, estimate that about one kilogram of organic matter per meter length of stream transports downstream on an annual basis. This matter is transported downstream and is part of the food supply for invertebrate populations; which, in turn, become food for fish populations. Accordingly, the length of stream buried by mining or valley fills displaces the biomass and proportionate amount of energy provided by fine- and coarse-particle organic material leaving a particular reach of headwater stream. [Chapter III.D.; Appendix I; Appendix D (Value of Headwater Streams Workshop); Wallace, 1992.]

Research outside of the EIS study area found that when leaf litter was excluded from a stream, macro invertebrates dependent on the litter declined, as did invertebrate predators and salamanders. The research also established that rapid recovery of aquatic organisms occurred when leaf litter was restored. Consequently, leaf litter exclusion as a result of MTM/VF may affect aquatic productivity downstream to some extent due to this terrestrial-aquatic interrelationship.

No widely-accepted, standardized testing procedures exist for measuring the presence/absence of the fine and coarse organic matter and consequent energy contributions of stream. Thus, the EIS stream chemistries studies in West Virginia and Kentucky did not document the effect of stream loss on the downstream energy continuum.

The estimates of potential future stream loss are liberal, in that they do not take into account the focus on avoidance, minimization, and mitigation requirements in the 2002 NWP 21. Independent of any other future actions, the 2002 NWP 21 will likely reduce the rate of stream loss that occurred in the preceding ten-year time frame for permit footprints; or in the 17-year time frame for fill footprints.

Similar effects to headwater and larger streams occur from other human activities, such as road building and development for industrial/residential/commercial sites in steep-slope Appalachia. As discussed by Yuill in the post-mining land use report, suitable developable land is in short supply in some parts of the West Virginia study area [Appendix G]. Consequently, creation of areas suited for roads and development often places fill materials in streams. Based on the current demographics in the EIS study region, coal mining operations are likely to have the consequences of disturbing more land than residential, industrial or commercial development in the coalfields. Nonetheless, the CWA requires consideration of the cumulative effects of all activities and SMCRA requires assessment of the hydrologic cumulative effects for all coal mining in a watershed. These evaluations are integral to decision making on authorizing MTM/VF projects and aid in minimizing the cumulative effects of direct stream loss.

The No Action Alternative and action alternatives will not eliminate the loss of stream segments and reduction in organic matter transported downstream. In the absence of standardized testing and research, it is not clear to what extent this direct stream loss indirectly affects downstream aquatic life. It is also not evident to what degree reclamation and mitigation (e.g., drainage control and revegetation) offset this organic nutrient reduction. The direct impacts of stream loss are permanent, but the downstream effect from organic energy loss may be temporary. Existing CWA programs indirectly address these effects through technology-based effluent limits, state water quality standards, TMDLs, and other provisions designed to assure overall watershed health.

SMCRA and CWA program improvements common to the action alternatives, summarized in Chapter II.B and described in Chapter II.C, will serve to reduce future direct stream loss. Implementing requirements, policies, and guidance relative to increased/shared data collection and coordinated analysis of predicted impacts by the agencies; emphasis on avoidance, fill minimization, and site selection; mitigation of the loss of aquatic functions; use of ADIDs and BMPs; and, establishing minimal/cumulative impact thresholds (if feasible) and consistent stream definitions and delineation techniques, will operate to minimize future direct stream loss under all action alternatives.

b. Indirect Stream Impacts

The consequences of direct stream loss and energy transport reductions, discussed above, also indirectly affect downstream stream reaches. MTM/VF has the potential to alter the chemistry, water temperature, flow regime and geomorphological features downstream. Stream chemistry showed increased mineralization and a shift in macroinvertebrate assemblages from pollution-intolerant to pollution-tolerant species. Water temperatures from valley fill sites exhibited lower daily fluctuations and less seasonal variation than water temperatures from reference sites. Daily stream flows from studied valley fill sites exhibited greater base flow than reference sites. Smaller sediment particle sizes were found in downstream substrate. [Chapter III.D; Appendix D]

Scientists postulate that stream thermal regimes, which can influence microbial activity, invertebrate fauna, fish egg development, larval growth, and seasonal life cycles, may be affected by valley fills and sedimentation ponds at the base of the valley fills. Scientists also theorize that, as mining or other human development practices eliminate first order streams, unique biological diversity may be affected, especially if rare species occur in only one or two spring or seepage areas and are impacted. [Chapter III.D; Appendix D]

Headwater stream systems do not have a tremendous capacity to provide purification functions. Although these ecological processes are not one requiring protection, the absence of streams to provide this function reflects the sensitivity of the system to inputs of a variety of potentially toxic materials. As groundwater and infiltration move through surface coal mining operations a variety of potentially toxic materials are released into the environment, including metals and mineral constituents such as sulfates which, if at high enough levels, may act by altering physical characteristics of water (e.g. pH or specific conductance). Headwater streams, with their innately limited buffering capacity and lack of ability to sequester and precipitate out contaminants, tend to be at risk from any input of toxic materials exceeding the streams limited capacity to assimilate. [Chapter III.D.]

The EPA Water Chemistry Report found elevated concentrations of sulfate, total and dissolved solids, conductivity, selenium and several other analytes in stream water at sampling stations below mined/filled sites [Appendix D; USEPA, 2002b]. Other studies found elevated concentrations of sulfates, total and dissolved solids, conductivity, as well as other analytes in surface water downstream from MTM/VF sites.

Studies conducted as part of this EIS show that aquatic communities downstream from MTM/VF differ from unmined headwater streams in several ways. In most cases, there were differences in biological assemblages. Generally, macroinvertebrate communities below mined areas were more pollution tolerant than those below unmined watersheds. However, biological conditions of filled sites represented a gradient of conditions from poor to very good, demonstrating a wide range of conditions that may be found in aquatic communities downstream from MTM/VF or other human disturbances [Appendix D; USEPA, 2000 (Green, et. al.)].

The Aquatic Impacts Statistical Report indicated that ecological characteristics of productivity and habitat are easily disrupted in headwater streams [Appendix D; USEPA, 2003)]. Accepted indices and comparisons correlated chemical and biological (macroinvertebrates and fish) parameters in unmined, filled, filled/residential and mined sites. The analysis indicated that biological integrity is hampered by mining and that unmined sites have a higher biotic integrity with more taxa and more sensitive taxa. The strongest association with water chemistry suggested that zinc, sodium, and sulfate concentrations were negatively correlated with fish and macroinvertebrate impairments. Selenium and zinc were negatively correlated with the West Virginia Stream Condition Index (WVSCI). The potential drivers of these conditions are mining practices, material handling practices, and the geological factors associated with specific coal seams and overburden. However, the study also concluded that insufficient data existed to determine the temporal nature of the impact or the distance downstream that the impacts persist. Due to the limited scope of the studies performed for the EIS, no correlation could be made of downstream impacts with the age, number, and size of mining disturbances and fills, nor could data differentiate impacts of mining, fills or other human activity in a watershed.

Wetlands are among the most effective ecosystems for removing pollutants and purifying wastes. Wetlands operate through a series of interdependent physical, chemical and biological mechanisms that include sedimentation, adsorption, precipitation and dissolution, filtration, biochemical interactions, volatilization and aerosol formation and infiltration [USEPA, 1999; Appendix D]. Constructing wetlands is a possible mitigation measure for impacts to headwater streams. While this issue is complex, there may be opportunities to construct wetlands at MTM/VF operations, including at the toe of fills where groundwater emerges to improve the water quality of streams downstream from fill areas. The success of these wetland systems to improve water quality would be highly dependent on the toxicity of the water initially.

Other human development activities, such as logging and other types of excavation, also pose potential threats to the nutrient cycling function, sedimentation, and other physical, chemical, and biological impacts to headwater streams in the EIS study area. However, the permanent nature of filling discussed under direct loss, as compared to the more temporary impacts from forestry, would suggest that MTM/VF impacts (e.g., nutrient cycling function, biological diversity, mineralization, substrate composition, etc.) of headwater stream systems may have a longer-term impact on this system, although data do not currently suggest the duration of these impacts.

The indirect impacts from MTM/VF will continue regardless of alternative selected by decision makers. However, CWA programmatic controls discussed in direct stream loss are in effect under all alternatives and share the common objective of assuring the overall health of the watershed [Chapter II.C.3.a.1]. The NWP 21 and IP process require the following:

- use of functional assessment stream protocols to identify the type and character of aquatic resources that may be impacted
- prediction of potential impacts and alternatives analysis
- avoidance of high quality resources, if practicable to site activities elsewhere
- minimization of impacts
- adequate mitigation to offset unavoidable impacts, function for function
- demonstration that impacts, individually and cumulatively, are minimal for NWPs and less than significant degradation for IPs
- meeting water quality requirements

The actions proposed and common to Alternatives 1, 2, and 3, when implemented, will further mitigate indirect impacts. In particular, the coordinated and collaborative MTM/VF proposal review described in the alternatives should result in improved environmental outcomes because of the synergy of joint reviews and shared expertise, on top of improved and increased data collection and analysis. Consideration of the necessity of additional water quality parameters by EPA will take into account the indications of increased mineralization and biological effects from MTM/VF, along with additional study of the duration and downstream extent of these impacts relative to size, number, and age of MTM/VF impacts. The development of a BMP manual for mitigation, in concert with a similar document for improved forestry reclamation, would suggest practices designed to reduce the indirect effects in association with the existing CWA controls described above.

c. Stream Hydrology

Hydrologic modeling studies performed for the MTM/VF EIS found that peak storm water flows are slightly higher during and after mining. The West Virginia Governor's study on flooding found similar peak runoff increases due to timbering. The studies concluded that whether or not these increases exceed bank-full conditions and contribute to flooding are highly site dependent. Hydrologic results from field studies indicate that runoff and ground water are stored in valley fills, tending to increase the base flow of the stream and decrease the peak flows during storm events. As discussed in indirect impacts above, since valley fills create more perennial base flows, the water temperature is less variable than in unfilled watersheds. [Chapter III.G.; Appendix H]

These types of flow impacts appear to be unique to MTM/VF and timbering activity in the study area. Other activities that might affect hydrologic patterns, such as agricultural practices or water withdrawals, appear to have limited impact. MTM/VF, forestry, and human modifications to stream channels and flood plains (fills, bridges, stream crossings, and other encroachments) are the dominant impacts altering the hydrologic patterns in the study area. Alterations in hydrologic patterns may have further impacts on other ecological processes and are discussed under those processes.

CWA Section 404 reviews of MTM/VF activities consider flooding potential. SMCRA considers not only the flooding potential of individual projects, but also the cumulative impacts to the hydrologic balance (including the impacts to quantity and quality of surface water) of all surface coal mining and reclamation operations in a defined cumulative impact area. In addition to the existing flooding and cumulative impact requirements in effect under all alternatives, the action alternatives consider clarifying the appropriate analytical methods and potential remedial techniques to assess and counter flooding risk.

d. Fill Minimization

Fills sizes and numbers, over time, were previously discussed in relation to direct stream loss and are provided in Chapter III.K.2. Prior to 1999, the design of excess spoil disposal areas focused on ensuring that excess spoil fills were safely designed and stable as opposed to avoiding streams and minimizing the volume and areal extent of excess spoil fills. As discussed later under the heading of fill stability, this focus appears to have been effective in reducing the number of slope movements. Increased emphasis on SMCRA proposals attaining AOC since 1999 has resulted in smaller fills. Concurrently, increased accentuation on avoidance, mitigation, and mitigation in the CWA Section 404 program has reduced fill sizes. These regulatory provisions, along with the general 250-acre minimal impact threshold applied by the COE in West Virginia, shifts in coal production, court injunctions, and difficulty in finding investment capital may have also resulted in fewer and smaller fill impacts. [Chapter II.D.]

The No Action Alternative would continue to emphasize AOC, minimizing the amount of spoil identified as excess, and, as a result, minimize valley fill volume and associated impacts. The SMCRA agencies in the EIS study area (OSM in Tennessee, DSMRE in Kentucky, DMLR in Virginia, and DEP in West Virginia) have developed technical guidelines that assist the surface mining permit applicant to demonstrate that excess spoil will be minimized by returning the maximum amount of mine spoil to the mined-out area. Policies established by the four SMCRA agencies for determining AOC and thus accounting for the excess spoil can be found in Appendix J. The West Virginia "AOC+ protocol" is a systematic method for maximizing the return of spoil to the mined out area. Chapter IV.I.4.a describes how this fill minimization analysis can result in fewer and smaller fills and commensurate reductions in stream impacts and mitigation costs.

The AOC+ and other guidelines do not, in of themselves, consider the condition of the streams considered for fill location; however integral aquatic ecosystem evaluations as part of the SMCRA review can result in narrowing the potential valleys evaluated for fills, based on a preference for disturbing previously-impacted or impaired streams segments over those in a natural, undisturbed condition. Such quantified, objective evaluations of excess spoil disposal plans result in reduced impacts to valleys and streams by requiring that applicants demonstrate that fill minimization has been achieved in their proposed mine plans.

Another consequence of fill minimization may be valley fill or backfill stability. The strong financial incentive to avoid streams will result in higher and, possibly, steeper backfills. Minimizing stream length impacted will also force valley fills higher in watersheds, where steeper foundation conditions are typical. Steeper and higher backfills and valley fill toes on steeper foundations present higher probabilities for slope instability. These conditions increase the challenge to geotechnical engineers to design fills and backfills to meet the SMCRA safety factor requirements. The SMCRA regulations do not allow construction of valley fills under steep foundation conditions without special measures to assure stability. Design and construction costs for more stable valley fills can be considerable if rock toe buttresses or key-way cuts are necessary to shore up the out slopes.

Under the No Action and action alternatives, the CWA Section 404 program requires demonstrations of avoidance, minimization, and mitigation of unavoidable impacts. The consequences of these provisions were discussed in the direct stream loss and indirect impact narrative above, and may not have markedly different consequences relative to project-by-project fill minimization. However, Actions 3 and 9 combine to clarify the OSM SBZ rule and develop rules requiring applicants to demonstrate excess spoil is minimized, streams have been avoided as practicable, and that fill locations represent the least environmental damaging alternative. By increasing SMCRA program consistency with CWA Section 404 objectives, fill minimization would become a common goal assessed with uniform importance across the programs. These proposed SMCRA changes, in aggregate with the coordinated decision making envisioned under the three action alternatives and other proposed actions, would provide incremental benefits over no action.

For instance, additional resource data and improved impact predictions would result in more-informed decisions about fill numbers, location, and sizes. Similarly, increased consideration of mitigation requirements and better controls on mitigation success should improve environmental consequences over the No Action Alternative. The effect of alternative analysis and mitigation costs on reducing fill numbers and sizes is discussed in the Chapter IV.B.1.e and IV.I. EPA and COE exploration of designating certain streams as generally unsuitable for fills could reduce cumulative effects of valley filling [ADID, Chapter II.C.3, Action 4]. The information sharing and automation of data relative to aquatic resources should also have a positive effect on minimizing fills, individually and cumulatively.

The continued analysis of data collected during implementation of the CWA Section 404 program by the COE and possible future identification of minimal and cumulative impact thresholds has the potential to minimize fill sizes. Mining companies have demonstrated that these thresholds, which define the appropriate CWA Section 404 permit process, influence mining plans. During the interim permitting process in WV (as a result of the *Bragg* settlement), applicants for 81 MTM/VF projects limited fills to less than 250-acre watersheds. Only 5 applicants proposed MTM/VF projects with fills exceeding this watershed size. This threshold would continue to apply to certain geographic locations under the No Action and Preferred (Alternative 2) Alternatives and it is anticipated that the consequences to fill size would continue.

Although a minimal impact threshold may reduce the size of fills, it could actually cause greater stream impacts by requiring the construction of valley fills in a greater number of headwater stream segments. However, cumulative impact requirements of the CWA Section 404 and SMCRA are designed to evaluate the benefit of fewer larger fills versus greater numbers of smaller fills. This consideration should occur under all alternatives; although the action alternatives, with the greater coordination and increased data collection and analysis, should create improved results over the No Action condition.

e. Mitigation

The effectiveness of reclamation and mitigation practices to restore stream habitat and aquatic functions impacted by MTM/VF are discussed in Chapter III.D and Appendix D. The alternatives proposed, including the No Action Alternative, assume successful mitigation through on-site reclamation and on-site and off-site mitigation. These practices may include stream construction or enhancement, the construction of other aquatic systems, such as wetlands, and the restoration or enhancement of riparian habitat to compensate for the loss of aquatic functions. Preservation of high quality streams through creation of conservation easements or land trusts, and the payment of in lieu mitigation fees for stream protection and restoration measure would be included as compensatory mitigation possibilities. Mitigation requirements are described in Chapter II.C.6 and project examples are discussed in Chapter III.D.

Because all alternatives require mitigation of unavoidable impacts to the waters of the U.S., applicants will be seeking sites suited for restoration. Limitations exist for developing in-kind mitigation projects on reclaimed mine sites. In-kind mitigation must restore or create headwater stream habitat on the reclaimed mine area to replicate the functions lost from direct stream loss. The consequences of the No Action Alternative are dependent on the ability of the COE and SMCRA agencies to require the applicant to achieve functional replacement through on-site reclamation. Additionally, the COE must also require the applicant to make up any mitigation deficit through off-site, in kind or compensatory mitigation projects.

The Appalachian coalfields provide almost limitless opportunities for watershed improvement, following more than 100 years of abandoned mine land (AML) problems. Mine drainage pollution, eroding spoil on the downslope, clogged stream channels, abandoned highwalls and coal refuse areas, and other orphan land problems exceed the capacity of the SMCRA AML Trust Fund. Many of the problems are such low priority it is unlikely that the AML program will ever address them. Mitigation projects for watershed restoration of AML problems, oil and gas industry problems, and a host of other watershed management issues (encroachment, sewage treatment, dredging, creation of wetlands, re-channelization using state-of-the art stream restoration, etc.) could not only offset but also enhance aquatic resources. Some mitigation projects may be possible in the same watershed as the MTM/VF project and may provide a close fit to the functions lost by valley fills (in-kind, in-basin). Other mitigation projects may be in the same basin or elsewhere and not provide the exact match of functions lost by valley fills, although related aquatic resource improvements would occur (out-of-kind or in lieu fee).

The renewed NWP 21 has been in effect a little over one year. Due to the recent *Rivenburgh* injunction, the effectiveness of mitigation to offset unavoidable impacts from MTM/VF projects has not been widely demonstrated. If future mitigation mirrors past intentional or unintentional reclamation practices and state-required mitigation projects, successful restoration of habitat for organisms requiring lotic (flowing) conditions may be very limited. Selection of the No Action Alternative could also result in out-of-kind mitigation projects successfully developed on MTM/VF reclamation sites that generally result in the creation of palustrine or pond-like wetland or linear, drainage ditch-type wetlands. These water bodies provide some of the same functions as headwater streams, but they do not fully compensate for the physical loss of aquatic habitat or serve all of the functions affected by MTM/VF activities, especially if impacted streams were of high quality. Stream relocation, aquatic habitat restoration, and natural channel configurations are also utilized in reclamation. Sediment stabilization, wildlife support, and potential water quality improvements are other types of aquatic resource mitigation projects that were most successful in the past and could be employed under the No Action Alternative. The No Action Alternative provides, under NWP 21 and SMCRA, that on- or off-site mitigation plans must be successfully completed. Inspection and financial assurance of mitigation activities are required under the No Action Alternative; but mitigation procedures or the agencies are not as coordinated as proposed under the action alternatives.

In most situations, under all alternatives, some type of on-site restoration, as a component of reclamation, would be included as part or all of the mitigation needed to replace lost functions from headwater streams. Where the streams directly impacted from mining are of low quality, restoration of stream functions on-site may be the only required mitigation. However, for most sites it is anticipated that both on-site and off-site mitigation will be necessary to insure that only minimal individual and cumulative impacts occur. Under all alternatives, the utilization of a stream assessment protocol provides a more accurate characterization of the loss of aquatic functions and the ability to more accurately predict the opportunity to restore aquatic functions loss at the reclamation or mitigation site. The protocol, described in Chapter II.C.6.a.1, also plays a substantial role in identifying high quality streams for avoidance, to reduce the impacts to these aquatic resources as well as the associated mitigation costs.

The functional assessment will apply under all alternatives, and involves the application of the developed models and the calculation of ecological integrity indices for a defined headwater stream ecosystem under existing (i.e., pre-project) conditions and predicted (post-project) conditions. The results of using the protocol are the following:

- Description of the potential impacts of a proposed project
- Description of the actual impacts of a completed project
- Identification of ways to avoid and minimize impacts of a proposed project
- Determination of the least damaging alternative for a proposed project
- Determination of compensatory mitigation needs for a proposed project
- Determination of restoration potential for headwater streams
- Development of design criteria for stream restoration projects
- Planning, monitoring, and managing stream mitigation or restoration projects
- Evaluation of performance standards or success criteria for headwater stream mitigation efforts
- Comparison of stream management alternatives or results
- Determination of appropriate in-lieu-fee ratios
- Identification of priority sites for in-lieu-fee mitigation projects.

An example of protocol application is provided in Chapter IV.I.4.c. In the case study, an eastern Kentucky coal company proposal to construct three valley fills in 1,562 linear feet of intermittent stream reaches and 3,132 linear feet of ephemeral stream reaches; the largest headwater stream reach drained 246 acres. Three temporary sediment ponds were proposed to impact 300 linear feet of ephemeral stream and 2,200 feet of intermittent streams. Approximately 950 linear feet of ephemeral stream and 1,844 linear feet of intermittent stream reaches were proposed for temporary sediment transport impacts between the fill areas and the sediment ponds.

After utilizing the stream assessment protocol to evaluate the stream impacts and the amount of mitigation necessary, the company presented a revised application and a new proposal. The use of the protocol provided a mechanism for identification of higher quality streams impacted by the original proposal and allowed consideration of costs of different alternatives for the mining plan. The company determined that they could dispose of more material in mined areas and reduce the amount of excess spoil proposed for valley fills. The company proposed to avoid placing fill material into waters of the U.S. except for one fill and one sediment pond. The valley fill was sited in the lowest quality stream (impacting 980 linear feet of intermittent stream), further reducing mitigation requirements. The applicant satisfied compensatory mitigation needs through a combination of on-site stream restoration of the areas between the fill and ponds (and beneath the ponds, upon removal), incorporating natural channel design into their new stream channel construction and payment of in-lieu-fees to make up the balance for the permanent losses associated with the one valley fill. By using the stream assessment protocol and choosing to avoid and minimize stream impacts, the required in-lieu mitigation fee was also reduced from approximately $300,000 to $128,000.

As a consequence of all alternatives involving mitigation, there will be a strong disincentive for the applicant to disturb stream segments. The cost of mitigating to restore aquatic functions is proportionate to the quality of stream segments impacted. That is, the consequences of mitigating high quality streams will be greater than impaired streams. Based solely on the COE example, the costs of mitigating (by in-lieu fee agreement) 724 miles of valley fill stream impacts in the Fill Inventory would exceed 516 million dollars.

The No Action Alternative and the three action alternatives could also provide additional environmental benefit through the mitigation requirement. If mitigation proves infeasible in certain locations, no mining could occur. If fill minimization/mitigation is difficult or impossible because of the application of the CWA 404(b)(1) Guidelines, some coal reserves may not be minable. The absence of mining in any area would result cumulatively and individually in less impacts to streams.

f. Stream Segment Definitions

As indicated in Chapter II.C.2, the Federal and/or state agencies propose to develop guidance, policies, or institute rule-making for consistent definitions of stream characteristics and field methods for delineating those characteristics. This action is common to all action alternatives.

Development of consistent definition in regulations and guidance for field delineation would provide another incremental benefit over the No Action Alternative. This benefit would occur because delineation of stream characteristics is key to understanding the aquatic resources proposed to be impacted and the level of mitigation required to offset unavoidable impacts. Consistent understanding of terms of regulatory significance improves communication among the regulated industry, the agencies, stakeholders, and provides the basis for both environmental, regulatory, and business decisions. Absent this action, confusion will continue in the No Action Alternative. The potential exists that misunderstandings on delineation could result in impacts to stream segments that might not occur with the additional information and understanding.

g. Bonding and Inspection

There are no defined, established procedures between COE and SMCRA authorities for coordinating on-site and off-site mitigation requirements, such as bonding and inspection. As such, there are both inefficiencies and risk in the current system. The risk is that in maintaining separate, uncoordinated systems, some aspects of a mitigation project may not be completed as required. The inefficiencies are present, as the current system now requires separate permitting, separate monitoring/inspection, and separate bonds for what is essentially a single (or at least closely-related) mining and mitigation project (reclamation/mitigation). Implementation of Action 10 would coordinate SMCRA and CWA requirements to establish financial liability (e.g., bonding sureties) to ensure that reclamation and compensatory mitigation projects are completed successfully.

2. Consequences Common to Alternatives 1, 2 and 3

Alternatives 1, 2, and 3 share actions designed to be more protective of aquatic and other resources, summarized in Chapter II.B and fully described in Chapter II.C, that would cause the following regulatory program changes, policies, or guidance:

- Consistent definitions of stream characteristics and field methods for delineation;
- Clarification of OSM stream buffer zone rule and development of excess spoil requirements for alternatives analysis, avoidance, and minimization;
- Continued evaluation of MTM/VF effects on water quality and EPA recommendations for new standards, as appropriate;
- Refined science-based protocols for assessing aquatic function, making permit decisions, and setting mitigation requirements;

- BMPs for the following:
  - functional assessment and mitigation
  - flooding analysis and remediation
  - reclamation with trees
  - control of fugitive dust and blasting fumes;
- Coordinated permitting, data collection and sharing, mitigation bonding and inspection;
- Development of science-based minimal impact thresholds for individual and cumulative impacts, if feasible; and,
- Program changes, if necessary to enhance ESA compliance

The action alternatives, by virtue of formalized coordination of agency roles, facilitate results that would be delayed or would not occur under the No Action Alternative:

- Enhanced environmental protection and minimized impacts through better information, analysis and collaborative government regulation.
- Improved government efficiency; implementing programs to achieve coordinated data collection/sharing and application processing that fulfill these objectives:
  - assure adherence to performance standards;
  - eliminate duplication by the agencies and applicants; and
  - provide for better integrated public participation.
- Supplemented data collection to accomplish the following:
  - better characterize environmental resources and establish their function in the ecosystem;
  - monitor impacts based on changes from baseline condition to determine if predictions were accurate; and
  - demonstrate compliance and/or reclamation/mitigation success.
- Strengthened prediction of impacts based on better data and analysis.
- Articulated regulatory concepts in the regulation of surface mining operations that accomplish these goals:
  - provide clear understanding of requirements and set expectations of industry and stakeholders
  - for making decisions;
  - improve environmental protection; and
  - assure public safety.
- Expanded best management practices in planning/design of mining, reclamation, and mitigation practices.

The action alternatives considered were developed to result in a better informed public and provide more meaningful participation, in part because plans would more thoroughly address impacts to environmental resources. Applicants would benefit from integrated regulatory programs under state and Federal environmental statutes. Many actions facilitate streamlined, sequenced review processes while improving environmental protection. Common data elements in a joint application form could lead to more efficient analytical approaches among the agencies. Reliance on these analytical results could facilitate agreements among agencies and provide a basis for one agency to confidently rely on the findings of another agency. A coordinated review process should reduce processing times and costs of permit applications, which may offset some of the increased costs and times associated with the additional data collection and analysis requirements of the actions. The program costs of Federally- versus state-administered application reviews, inspection, and enforcement for these actions are described in Chapter IV.I.

The aquatic resource data mandated by different regulatory programs results in costly collection and analysis of voluminous information, typically only assessed for particular program requirements. Compiling similar data from varied sources could serve multiple program goals and objectives. The use of GIS to compile other relevant resource, ecosystem, or community information is a logical augmentation to the aquatic data for use in COE NEPA compliance. Use of information technology to collect, compile, screen, and update aquatic and other resource information in GIS, linked to various databases, would provide for better informed and timely permit decisions regarding aquatic impacts and a reference library to assist in future decisions.

Increased environmental benefits to aquatic and related resources would be realized from the use of a coordinated permit process in combination with other regulatory aids and tools such as ADIDs and the COE stream assessment protocol. For example, the collaboration that would occur among the agencies in this coordinated regulatory process under the action alternatives would facilitate the effective application of the alternatives test required by the CWA Section 404(b)(1) Guidelines. The institutional expertise unique to each agency could be employed in consideration of a greater range of alternatives, such as placing excess spoil in adjacent, previously-mined areas in order to avoid or substantially minimize fills in waters of the U.S.

Moreover, joint evaluations of MTM/VF proposals would result in more expansive considerations of both environmental impacts and effective treatments to mitigate those impacts. This coordinated process would also facilitate selection, implementation and monitoring of mitigation projects. The coordinated process and actions that make up the action alternatives could minimize adverse environmental effects by enhancing consideration of the least damaging practicable alternative in fill placement; minimization of excess spoil material; consideration of adverse cumulative environmental effects; and, technology transfer to identify the best practices reclamation techniques available to avoid or minimize adverse environmental impacts.

Better stream protection from direct and indirect effects would result from improved characterization of aquatic resources; operations designed to avoid and minimize adverse effects and restore aquatic functions; and compensatory mitigation plans with improved design, inspection, and enforcement. Excess spoil fills would become smaller and placed in locations that minimize adverse environmental effects.

Under all action alternatives, the consequences would include development of a Memorandum of Understanding (MOA), outlining coordinated data collection/sharing, the process for permit review sequencing, agency responsibilities, and other relevant matters. Common to all alternatives is also development of a Field Operating Procedure (FOP) document to elaborate on the specifics of the coordinated, collaborative review and regulatory processes of the agencies.

The development of an MOA and FOP would promote a coordinated permit process; regular pre-application and Joint Permit Processing (JPP) meetings, as appropriate; standardized data collection to address identified gaps; further refinement and implementation of the COE stream assessment protocol in evaluating permit applications; development of permit application assessment and mitigation procedures based on these data; and utilization of and networking the expertise of the various agencies. The MOA could also reinforce protection of special environmental areas by containing information on existing regulatory tools for environmental protection of high value aquatic or other resources (e.g., underscoring the ADID process, designated special aquatic sites, and "Aquatic Resources of National Importance," as well as lands designated unsuitable for mining under SMCRA. An MOA could identify the role of the CWA Section 404(c) and (q) elevation process in the coordinated approach and describe the type of site-specific information necessary to justify formal written requests to the COE requesting NWP applications be processed as IP. The MOA or FOP could encourage interagency site visits to gather site-specific resource information on which to base impact predictions, allowing the agencies to make more informed decisions. The consequence is a coordinated, consistent impact prediction.

FOPs could establish particulars for efficient application sequencing and facilitate coordinated processing by a lead agency. A consequence of all of the action alternatives may be development of decision-making and dispute resolution procedures.

3. Consequences Unique to Alternative 1

Under this alternative, all MTM/VF projects proposing valley fills in waters of the U.S. would initially be reviewed by the COE as a CWA Section 404 IP rather than as a general permit [Chapter II.C.1.b.; Action 1.1]. The COE would make an initial case-by-case determination of the size, number, and location of valley fills in waters of the U.S. Following this initial determination by the COE, the applicant could commence the SMCRA and other requisite application processes (e.g., NPDES, MSHA, etc.). The result of this alternative would be a series of consecutive, coordinated reviews and decisions by the COE and appropriate SMCRA agency. Any subsequent actions under SMCRA or other laws on a permit application would recognize the constraints established by the COE. The COE would also rely on the subsequent SMCRA permit application for information pertinent to whether an EIS or EA is needed.

The consequences of processing most MTM/VF applications as IPs are the case-by-case application of the CWA Section 404(b)(1) Guidelines, the NEPA, and public interest review. These processes present the potential for a more lengthy permit process for the applicant and additional data collection and analysis. For instance, NEPA compliance may require either development of an EA/FONSI or EIS. NEPA focuses not only on the environmental effects of the proposal, but all human activities in the area. NEPA and IPs imposes greater scrutiny of the application by a wider audience of government agencies and the public.

Conversely, processing MTM/VF applications as IPs provides the applicant the possibility of receiving authorization for larger fills. While CWA Section 404 requires mitigation of all unavoidable impacts, an IP project must mitigate to a level less than significant adverse impacts. Projects processed under a general (e.g., NWP) permit must mitigate to minimal impacts. Accordingly, these impact levels could correspond with approval of larger fills under an IP.

Alternative 1 involves the COE performing the necessary avoidance, fill minimization, and mitigation assessment of MTM/VF proposals. The COE and EPA have affirmed that use of the WVDEP AOC+ policy satisfies the requisite alternative analysis required by the CWA 404 (b)(1) Guidelines. For consistent application across the various COE Districts with jurisdiction over CWA

Section 404 coal mining activities in Appalachia, the COE would either evaluate the adequacy of existing state SMCRA authorities AOC policies or develop other procedures for applicants in Virginia, Kentucky and Tennessee to demonstrate that projects have satisfied the CWA Section 404 (b)(1) Guidelines.

Inasmuch as the COE is initially determining the size, number and location of fills under Alternative 1, it would not include SMCRA agencies requiring or applying functional assessment protocols [Chapter II.C.6; Action 11]. The consequence of Alternative 1 not containing this requirement in the SMCRA program is insignificant since the COE would apply the protocol.

Alternative 1 also does not include a continuation of any regional conditions established as part of the No Action Alternative. This action would be unnecessary since the applications would all begin processing as an IP.

Alternative 1 includes the potential use of the advance identification (ADID) process by the EPA and COE to designate specific headwater resource locations as generally unsuitable as fill [Chapter II.C.3; Action 4.1].

4. Consequences Unique to Alternative 2

The consequences of Alternative 2 relevant to aquatic (and other environmental) resources would include those described in Chapter IV.B.2. and IV.B.3. The major distinction of Alternative 2 is the process and coordination among the COE, EPA, OSM, FWS, and their state counterparts in considering MTM/VF proposals. Another distinction of Alternative 2 is the concept of a joint application. Such an application would assure the most thorough description of the resources affected, projected impacts to those resources, and a detailed reclamation/mitigation plan.

The COE would make case-by-case evaluations of site-specific impacts to determine the appropriate CWA Section 404 review process (i.e., IP or NWP 21). Any existing regional conditions, such as a 250-acre watershed minimal impact threshold, would continue to be implemented under this alternative until revoked or replaced. These regional conditions are described in the No Action Alternative [Chapter II.C.1.a.1.].

Following the COE determination of the appropriate CWA Section 404 process applicable to the MTM/VF application, the consequences would be identical to Alternative 1 for any proposals determined to warrant an IP. Conversely, those applications determined to merit NWP 21 authorization would begin processing with the SMCRA regulatory authority, as described in Alternative 3. Following SMCRA processing, the COE would consider NWP 21 authorization, based largely on the SMCRA review.

These evaluations would be based on proposal-specific information sharing and early coordination of these agencies. Facilitated sequencing of agency permitting processes would have the consequence of better-informed and timely decision making. This alternative is the preferred alternative for the agencies because of the improved efficiency, collaboration, division of labor, benefits to the public and applicants, and the recognition that some proposals will likely be suited for IPs, and others best processed as NWP 21.

Independently, but in concert with these actions under Alternative 2, the current rule-making effort by OSM would continue, in order to clarify the SMCRA obligations to minimize excess spoil and the adverse impacts stemming from valley fill construction [Chapter II.C.5.a.2]. This revision to the SMCRA regulations would not only be in accord with SMCRA provisions, it would also increase consistency with CWA Section 404(b)(1) Guidelines. As a consequence of Alternative 2 OSM would also consider whether additional future rulemaking is warranted to increase consistency with the CWA Section 404 program and/or fine tune fill minimization and alternative analysis that grow out of the ongoing rule making [Chapter II.C.3.a.2]. OSM rule-making may be appropriate after experience is gained with Federal and state agencies involved in the development of elements of coordinated decision making and collaborative CWA/SMCRA permitting program.

The creation of the MOA, FOP, joint application, etc., may indicate that additional data collection, impact predictions, and analysis could increase SMCRA consistency with CWA standards, e.g., by satisfying other elements of CWA Section 404(b)(1) Guidelines analysis. OSM could consider future amendments to the excess spoil rules and/or other permitting/performance requirements in this regard. Following state modification of their SMCRA-based programs to conform with OSM rule making, a state might consider seeking CWA Section 404 authority for approval of MTM/VF proposals eligible for the NWP 21, using the COE state programmatic general permit (SPGP) [Chapter I.C.1.a.2]

5. Consequences Unique to Alternative 3

The goal of this alternative would be to enhance the SMCRA programs, as described in Alternative 2 above, to satisfy the informational and review requirements of the CWA Section 404 program. In this manner, the SMCRA process would minimize, to the maximum extent possible, the adverse effects of MTM/VF and create a more effective and efficient permit application review process. The principal difference between this alternative and Alternative 1 is that the enhanced SMCRA regulatory process could provide the regulatory platform to ensure that MTM/VF in waters of the U.S. comply, to the extent allowed by SMCRA through the proposed rule-making, with the CWA Section 404 program. This alternative differs from Alternative 2, which describes a coordinated interagency screening process to determine the type of COE CWA Section 404 permit needed for MTM/VF in waters of the U.S. That is, under Alternative 3, all applications would begin processing by the SMCRA regulatory authority to determine the size, number and location of valley fills.

Alternative 3 is based on an assumption by the COE that MTM/VF applications begin processing as NWP 21 because the SMCRA review is the functional equivalent of an IP. An exception to this assumption is the COE authority to require additional off-site mitigation to offset unavoidable impacts to waters of the U.S., which would be assured by the COE under CWA Section 404 review. Under this alternative, the SMCRA regulatory authority would be the lead review agency, reducing duplication of CWA regulatory control exercised by the COE. This would meet the purpose of the general permit process envisioned by the CWA Section 404(e). [Chapter II.C.1.d, Action 1.3.] While the COE retains responsibility for authorizing CWA Section 404 permits, the information collected and analyzed by the SMCRA agency would allow the COE to process most permits under NWP 21. Under Alternative 3, it is more likely that a state may seek partial CWA Section 404 authority through a SPGP, or through full assumption of the CWA Section 404 program [Chapter II.C.1.a.2].

The COE would also be responsible for mandating and retaining its jurisdiction for appropriate compensatory mitigation to offset unavoidable impacts to aquatic resources. Currently, unlike the COE, SMCRA agencies may not have the statutory basis to require off-site compensatory mitigation. Most states in the EIS study area require compensatory mitigation through either the CWA Section 401 water certification process or state water quality laws. Under this alternative, the SMCRA agency would work closely with the COE to determine the extent of on- or off-site compensatory mitigation needed to offset unavoidable adverse effects of MTM/VF to waters of the U.S. Any regional conditions established under the No Action Alternative will not be continued under Alternative 3.

C. SOILS & VEGETATION

Chapters III.B. and III.F, of this EIS describe the existing Appalachian forest environment (vegetation and soils) and the importance of this forest environment in helping to define the ecosystem as it exists today. As indicted in Chapter III.F., the vast majority (approximately 92%) of the study area is forest land. Mixed mesophytic hardwoods, predominantly comprised of various oaks, maples, yellow poplar, beech, white basswood, and other species, are the dominant forest cover type within the study area.

This EIS contemplates two actions specifically related to deforestation. These actions are identified and described in Chapter II.C.8.b. as Action 13 and Action 14. Action 13 includes the cooperative development and identification of state-of-the-science BMP's for enhancing establishment of forests as a post-mining land use. Action 14 states that if legislative authority were established on either a Federal or state level, reclamation with trees could be required as a post-mining land use. The benefits these actions would provide to the successful establishment of forests on reclaimed mine sites are described in the Chapter II.C.8.b discussion of the actions. These two actions are incorporated in Alternatives 1, 2, and 3.

MTM/VF operations generally impact large areas of the forest community as the development of an individual mine can result in disturbance or removal of a few hundred to a few thousand acres of forest cover. The quality of the forest and the associated habitat impacted by a mine can vary depending on a number of factors such as extent of previous mining, past logging activities, other mineral extraction activities such as oil and gas, previous land management practices, etc. Regardless of the type or quality of forest cover that existed prior to mining, certain impacts can be generalized in association with any mine or any activity that disturbs large areas of forest. For example, unlike traditional logging activities associated with management of a hardwood forest, when mining occurs, the tree, stump, root, and growth medium supporting the forest are disrupted and removed in their entirety.

The likelihood of natural regeneration within the mine site is contingent upon the reclamation practice and post-mining land use chosen. Given that MTM/VF occurs along the ridge tops, reclaimed mines, when the post-mining land use is a category other than forest, typically create large expanses of open area devoid of seed source trees. Seed source trees in adjacent unmined areas are typically at an elevation below the reclaimed ridge top, limiting natural succession of forest cover from adjacent areas [Appendix E (Handel, 2002)]. In this type of ridge line mining and reclamation environment, for a number of years to come, the forest is replaced by a grassland and/or herbaceous/shrub vegetative community with different topographic and hydrologic conditions than those that existed prior to mining.

The Landscape Scale Cumulative Impact Study modeled terrestrial impacts based on past surface mine permit data [Appendix I; EPA, 2002]. Tables IV.C-1 through IV.C-4 were developed from these data and provide a retrospective of the impacts to forest that occurred over the 10-year period from 1992 to 2002. The tables estimate impact to the forest environment (vegetation and soils) in the study area from surface mining during this period at 380,547 acres or 3.4 % of the forest area that existed in 1992. When adding past, present and future terrestrial disturbance, the study area estimated forest impact is 1,408,372 acres which equates to 11.5% of the study area. This number is derived by adding grassland as an indicator of past mining, barren land classification, forest lost from the last ten years of surface mine permits and a projection of future forest loss that equates to the last ten years. The tables represent a worst case projection or overestimate of impacts to forest cover in the EIS study area because: 1) the data are projected under the assumption that the entire area within the permit boundary would be disturbed, and 2) the data do not include areas where forest regeneration is occurring on some mine sites, i.e., the amount of natural succession or managed forestry would decrease the affected acreage. Forests constantly change and evolve as a result of tree growth, aging, disease, and human disturbances continually affecting the extent and composition of the forest. For example, as one area is disturbed by mining or logging activity (i.e., forest cover removed), other areas which were affected years ago by similar activities such as logging or agricultural development revert back to forest.

The concept of forest regeneration is reinforced by information available on the National Geographic web site at http://magma.nationalgeographic.com/ngm/0211/resources_who.html. The link for the U.S. Forest Services's Forest Inventory and Analysis (FIA,"Forest Census"), provides data on the nation's forest census. This data, based on forest censuses in West Virginia (1989), Virginia (1992) and Tennessee (1999), shows the average annual cubic feet (c.f.) of forest growth (net growing stock) exceeds the c.f. of forest loss (removal and mortality) by 10 million c.f. in Virginia, 241 million c.f. in Tennessee and 257 million c.f. in West Virginia. This type of data for Kentucky was unavailable on this web site. Thus forest "losses" are generally offset by forest "gains" realized by the natural order of succession in the Appalachian region to a forested community. As indicated by these data, forests are dynamic. Neither the census, nor the "worst case" analysis of forest loss, can entirely characterize the "net" impact to forest as a result of a specific activity such as mining. With that in mind, the data in the tables is presented here simply to give the reader a "reasonable" estimate of the extent of forest that may have been affected by mining over the past ten years. The acreage of grassland and transitional areas represent an estimate of past impacts from mountaintop mining.

Table IV.C-1
Estimated Terrestrial Impacts: Kentucky Portion of the Study Area

	Baseline Condition (NLCDS)	Condition from Issued Permits	Projected Future Condition*
Forest Cover (ac)	6,400,838	6,145,256	5,889,674
Forest Cover (%)	92.8	89.3	85.6
Forest Loss (ac)	—	255,582	511,164
Grassland as indicator of past mining impact (ac)	268,603	267,414	—
Quarry/strip mines/gravel pits (ac)	37,710	271,972	—

NLCDS = National Land Cover Data Set
Source: Landscape Scale Cumulative Impact Study of Future Mountaintop Mining Operations, prepared by EPA, 2002.
* Projections are based on the assumption that, if no reforestation of mine sites ever occurred, forest loss acreage similar to the ten years (1992-2002) of permits would occur over the future ten years.

Table IV.C-2
Estimated Terrestrial Impacts: Tennessee Portion of the Study Area

	Baseline Condition (NLCDS)	Condition from Issued Permits	Projected Future Condition*
Forest Cover (ac)	960,455	951,301	942,147
Forest Cover (%)	89.5	88.6	87.8
Forest Loss (ac)	—	9,154	18,308
Grassland as indicator of past mining impact (ac)	59,173	58,980	—
Quarry/strip mines/gravel pits (ac)	1,208	10,601	—

NLCDS = National Land Cover Data Set
Source: Landscape Scale Cumulative Impact Study of Future Mountaintop Mining Operations, prepared by EPA 2002.
* Projections are based on the assumption that, if no reforestation of mine sites ever occurred, forest loss acreage similar to the ten years (1992-2002) of permits would occur over the future ten years.

Table IV.C-3
Estimated Terrestrial Impacts: Virginia Portion of the Study Area

	Baseline Condition (NLCDS)	Condition from Issued Permits	Projected Future Condition*
Forest Cover (ac)	1,166,652	1,137,428	1,108,204
Forest Cover (%)	86.5	84.3	82.1
Forest Loss (ac)	—	29,224	58,448
Grassland as indicator of past mining impact (ac)	129,110	128,120	—
Quarry/strip mines/gravel pits (ac)	18,982	49,458	—

NLCDS = National Land Cover Data Set
Source: Landscape Scale Cumulative Impact Study of Future Mountaintop Mining Operations, prepared by EPA, 2002
* Projections are based on the assumption that, if no reforestation of mine sites ever occurred, forest loss acreage similar to the ten years (1992-2002) of permits would occur over the future ten years.

Table IV.C-4
Estimated Terrestrial Impacts: West Virginia Portion of the Study Area

	Baseline Condition (NLCDS)	Condition from Issued Permits	Projected Future Condition*
Forest Cover (ac)	2,703,652	2,617,065	2,530,478
Forest Cover (%)	93.8	90.6	87.5
Forest Loss (ac)	—	86,587	173,174
Forest Loss from Valley Fills (ac)	—	18,338	—
Forest Loss from Mineral Extraction Area (ac)	—	45,544	—
Grassland as indication of of past mining impact (ac)	86,777	86,164	—
Quarry/strip mines/gravel pits (ac)	45,715	133,155	—

NLCDS = National Land Cover Data Set
Source: Landscape Scale Cumulative Impact Study of Future Mountaintop Mining Operations, prepared by EPA, 2002.
* Projections are based on the assumption that, if no reforestation of mine sites ever occurred, forest loss acreage similar to the ten years (1992-2002) of permits would occur over the future ten years.

There are also indirect effects related to removal of the forest associated with mining. Studies have shown that trees help remove certain elements from our air and sequester them. This process is know as "carbon sequestration." Thus the removal of forests means that those trees removed can no longer sequester carbon from the air, and depending on how the removed trees are utilized or disposed of, may re-introduce previously sequestered elements back into the air. [Chapter II.C.8.a.2.]

Another indirect effect is that, at least from a historical perspective, past mine reclamation practices have impacted the re-establishment of forests on the mine disturbance areas as described below in greater detail. When compared to pre-mine conditions, this has resulted in forest harvest cycles within the disturbed areas having been extended. Other indirect impacts also occur as the wildlife species occupying the pre-mining environmental niches are replaced by a different type of wildlife community adapted to the newly-established environment of the reclaimed mine site. Alterations of the hydrologic and terrestrial environments associated with the removal of the forest and subsequent mining are analyzed in Chapter II, III, and other sections of this chapter.

1. Consequences Common to the No Action Alternative and Alternatives 1, 2, and 3

When looking at the historical perspective of mountaintop mine reclamation between 1977 and 1997, information collected as part of this EIS indicated that the re-establishment of the forest community, either through reclamation or natural succession, was impaired [Chapter II.B.4]. At best, reforestation could only be considered marginally successful (poor survival and impaired rate of growth). In a desire to stabilize reclaimed mine sites to prevent slides, minimize erosion, maintain acceptable water quality, and achieve bond release in a reasonable time period, reclamation of mine sites created an environment that was not conducive to the establishment of trees. Reclaimed areas were heavily compacted to prevent slides, aggressive ground cover species were used to minimize erosion, and growth mediums having near to above neutral pH were selected and used to help maintain water quality. Each of these "typical" mine reclamation practices were subsequently found to contribute to the difficulties in re-establishing forest communities similar to those which existed prior to mining.

However, recent research at Virginia Polytechnic and State University (VPI) and the University of Kentucky has demonstrated that forest communities can be successfully re-established on reclaimed mine sites. Factors (such as compaction, competition from grasses, and wildlife browsing, etc.) impairing the ability to re-establish the forest on mine sites were identified and measures developed to correct these past problems [Chapter III.B.4]. Over the past few years, Kentucky, Virginia, and West Virginia have, through various regulations, advisory memorandums, etc., begun to press for use of many of the improved reforestation practices and procedures detailed in research.

Through efforts by the states, the OSM forestry initiative, and other technology transfer and regulatory incentive methods, landowners and the regulated community are becoming convinced to implement forestry post-mining land uses and on-the-ground results are meeting with some success. In Virginia, the majority of post-mining land uses proposed on coal mine sites are forestry. A study of the proposed post-mining land uses on current mountaintop mine sites in West Virginia revealed that 68% of the sites were to be reclaimed to forestry-related land uses [Appendix G; (Yuill, 2002)]. These efforts will not resolve all the problems that inhibited the successful establishment of forest communities on reclaimed mine sites. However, the research indicates that quality forest communities that equal or exceed growth rates that existed prior to mining can be successfully and economically established on these mined sites. As the state and Federal initiatives to improve the establishment of forests on reclaimed mine sites have only recently begun to be implemented (i.e., within the last five years), it would be premature to attempt to evaluate the success of these efforts at this time. However, the recent efforts in the study area states to promote forestry land uses and implement the procedures necessary to successfully establish a quality forest community provide indications that forests can be established on many of the reclaimed mine sites in a timely manner.

In the short term, the timely re-establishment of a quality forest community on reclaimed mine sites would not prevent the various impacts associated with mining-related disturbance to forest and soils as described above and in Chapter III. When MTM/VF mining occurs, coal is extracted to help meet the energy needs of the nation. But forests and forest soils are removed; hydrologic and aquatic impacts occur; terrestrial wildlife is impacted; aesthetic and quality-of-life values are impacted, and economic costs and benefits are incurred. However, it is anticipated that, with the implementation of the research recommendations, long-term environmental and economic benefits (productivity improvements) will be realized. Environmental benefits realized would occur by reducing the number of years to re-establish a quality forest community. In other words, the mine site reclamation would result in selection and use of growth mediums more conducive to establishment of trees and tree survival and growth rates more similar to (or better than) those existing prior to mining.

Although research has demonstrated that many of the tree species present in this area can be re-established on reclaimed mine sites, it is unlikely that all forest communities existing prior to mining such as cove-hardwood forests can be restored on these reclaimed sites. As post-mined sites will likely lack the requirements of slope, aspect, and soil moisture needed for cove-hardwood forest communities, it is unlikely that these particular communities can be re-established through reclamation (Strausbaugh and Core, 1997). However, regardless of the tree species, the reduction in the time required to re-establish a forest (commercial or otherwise) equal or better than that which existed on the disturbed areas prior to mining will also provide other environmental benefits such as: 1) an improved aesthetic environment as grass-shrub habitats that typically follow mining will be more quickly replaced by forest habitats; 2) resumption of carbon sequestration; 3) resumption of forest product utilization; 4) return of forest wildlife species similar to those that were present prior to mining; and 5) resumption of more normal hydrologic cycles (e.g. evapotranspiration cycles, peak flow), etc.

As previously discussed, vegetation and soils of the forest environment are totally disturbed when an area is disturbed for the purpose extracting coal by surface mining methods. Although SMCRA regulations require salvaging and redistribution of topsoil or acceptable topsoil substitutes as a growth medium, comments were received during scoping specific to the impacts to soils as a result of MTM/VF. A study (Sencindiver, 2001) was commissioned during this EIS "to evaluate physical, chemical, and microbiological properties of mine soils developing on reclaimed mountaintop removal coal mines in southern West Virginia." Recognizing that minesoils are "developing in drastically disturbed earthen materials," the study evaluated soil development on reclaimed MTM/VF sites varying from 8 to 30 years in age. The study concluded that although the properties of the older minesoils were more similar to native soils than were the younger minesoils, in general, "the minesoils are approaching stable, developed soils and should become more like the native soils as they continue to develop." This study, presented in Appendix E, tends to support a conclusion that impacts to soils from MTM/VF are not irreversible and that over time, soils similar to those that existed prior to mining are likely to be re-established on reclaimed mine sites.

As indicated in the discussion in Chapter IV.C.1.a., the Cumulative Impact Study in Appendix I was used to develop Tables IV.C-1 through IV.C-4. The impacts to forest and forest soils that occurred for the ten year period from 1992 - 2002 have subsequently been projected as the anticipated forest disturbance over the next 10 years (2003-2013). The tables project an estimated impact to the forest environment (vegetation and soils) in the study area from surface mining during this period at 380,547 acres or 3.4 % of the forest area that existed in 1992. So for the 20 year period from 1992 to 2013, the estimated impact in the study area would be 761,094 or 6.8% of the forest that existed in 1992. The "qualifications" of this estimate described in the Chapter IV.C.1.a., and the more recent trend data discussed in Chapter IV.B.2.a., must be considered when using this estimate. As indicated and discussed in detail in Chapter IV.B.2.a., recent changes have been made in the SMCRA and CWA programs which have resulted in reduction in the size and number of valley fills when compared to pre-1998 data. This reduction in size and number of fills would indirectly have resulted in a corresponding reduction in the number of acres of forest and forest soils impacted by MTM/VF. When the qualification statements and recent trend data are considered in totality, it is likely that the forest and forest soil impact predictions for the next ten year period will be less than the projected 380,547 acres.

2. Consequences Common to Alternatives 1, 2, and 3

Alternatives 1, 2, and 3 include Action 13. As described in Chapter II.C.8.b, this action envisions building on the recent efforts of the states and the OSM reforestation initiative by assembling the "best technology currently available" or proven "best management practices" (BMPs) for the design and implementation of mining and reclamation activities. A BMP guidance manual could subsequently be developed, in cooperation with the states and research community, for use by the regulatory agencies and the regulated community. A list of possible topics for which BMP's could be developed and a description of some of these topics is provided in Chapter II.C.8.b.

The development of a BMP manual as proposed in Alternatives 1, 2, and 3 could assist regulators in determining compliance with regulatory requirements such as selection of the best available growth medium, prevention of compaction, enhancement of wildlife habitat, and minimizing adverse impacts, to the extent practicable. As such, the overarching impacts of this action would be to expand the benefits described in the No Action Alternative beyond those who merely attend the reforestation symposia and beyond those states where the state regulatory agency has already implemented reforestation improvements.

Development and use of a BMP manual could have a number of potential benefits related to the use of trees in mine reclamation. The beneficial consequences might include:

- improving ability to establish trees and ensure the long-term success of the PMLU,
- reducing the time frames necessary for natural succession to occur,
- facilitating mine site reclamation by maximizing utilization of organic materials remaining after logging,
- enhancing wildlife habitat, and

- maximizing forest product recovery prior to mining to better meet demands for wood products and reduce the need for additional logging-related disturbances thus minimizing impacts to additional environmental resources

A number of BMPs could be developed, each of which may have economic implications for the landowners, regulatory agencies and/or the regulated community. Some BMP's may result in cost increases while others may lead to cost savings. However, the development and use of a BMP guidance manual could result in cost increases to landowners and the regulated community.

In a cumulative sense, the only difference between the No Action Alternative and the development and use of BMPs as a part of Alternatives 1, 2, and 3 is that this action anticipates broader acceptance and use of the BMPs to improve reclamation to a forest land use. The re-establishment of forests on mine sites would likely occur over a larger area, thus on a study area scale, further reducing the period required for sites to revert to forest, restore habitat, and provide forest products.

Post-mining land use (PMLU) selection is a key factor in the establishment of tree species on reclaimed mined land. Alternatives 1, 2, and 3 also include Action 14. As indicated in Chapter II.C.8.b, this action, if implemented, would have legislative authorities enact changes to SMCRA or similar State statutes, such that SMCRA regulatory authorities could require reclamation with trees as the post mining land use. If implemented, this action could further limit land use options available to a property owner under SMCRA regulations. The action could result in the more widespread use of trees as a PMLU and, from a cumulative impact standpoint, be more effective at assuring re-established values associated with a forest community following mining.

D. FISH &WILDLIFE

The southern Appalachians, of which the EIS study area is a part, have been identified by the Nature Conservancy as an important area in the United States for rarity and richness [Stein et al., 2000]. This region is known to have the highest regional concentration of aquatic biodiversity in the nation. For this reason, it is hypothesized that impacts which result in decreases in genetic diversity, as measured by loss of species, loss of populations or loss of genetic variants, may have a disproportionately large impact on the total aquatic genetic diversity of the nation. At the landscape or regional level, certain natural habitat types are especially important for the ecological functioning or species diversity of the ecosystem. Unusual climatic or edaphic (soil-based) conditions may create areas of important local biodiversity or disproportionally support ecological processes such as hydrologic patterns, nutrient cycling, and structural complexity. In general, these are remaining undisturbed natural areas, especially those that integrate the flows of water, nutrients, energy, and biota through the watershed or region (Polunin and Worthington, 1990). Headwater stream systems naturally provide these listed functions (USFWS, 1999).

Terrestrial impacts related to forest fragmentation, neotropical migratory birds, wildlife habitat loss, effects on endangered species, impacts on biodiversity, cumulative effects, and sustainability were studied and the results are in Appendix E. The effects of deforestation and forest fragmentation on plants and wildlife are also described in Chapter III.F. This chapter describes in detail the changes to the existing terrestrial environment that occur when large areas of forest community are disturbed or removed [Chapter IV.C]. These changes may be temporary until the forest recovers, or permanent if the site is developed. For a number of years to come, the forest ecosystem is replaced by a grassland and/or herbaceous/shrub vegetative community with different topographic and hydrologic conditions than the pre-mining forest. The wildlife species occupying the pre-mining environmental niches are replaced by a different type of wildlife community adapted to the newly-established environment of the reclaimed mine site.

The consequences of MTM/VF also may impact aquatic resources, including fish. The aquatic impacts were discussed above in Chapter IV.B. The results of technical studies provide insight into aquatic and impacts to fish (USEPA 2000; Stauffer and Ferreri 2002). The studies conclude that valley fills within a watershed may result in impacts to the downstream biotic community structure. A similar project undertaken under the Powell River Project in Virginia may determine whether or not impacts observed can be expected to occur on a larger regional scale [http://als.cses.vt.edu/PRP/].

1. Consequences Common to the No Action Alternative and Alternatives 1, 2 and 3

The Landscape Scale Cumulative Impact Study modeled terrestrial impacts based on ten years (1992-2002) of surface mine permit data (EPA, 2002). Tables IV.C-1 through IV.C-4 were developed from data presented in the Cumulative Impact Study [Appendix I]. The cumulative impacts to terrestrial wildlife species endemic to the MTM/VF portions of the study area would be in direct proportion to the impacts to their forest habitat. As forest habitat is impacted, the wildlife species utilizing that habitat would subsequently be impacted. In a cumulative sense, the greater the forest impact, the more widespread the impacts to terrestrial wildlife species. A description of the cumulative impacts to forest is in Chapter IV.C.

a. Terrestrial Habitat

The study area is rich in avian fauna and a number of species exist that require interior forest for successful breeding. While large tracts of intact forest are rare in the eastern United States due to a number of land use change associated reasons, the EIS study area is comprised of 92% forest. Deforestation and forest fragmentation may locally affect interior forest species such as migratory neo-tropical songbirds and other species that do not range but short distances, such as salamanders. On a regional basis though, if past practice from 1992-2002 occurs over the next decade, MTM/VF could account for 6.8% deforestation of the study area. This 6.8% represents 380,547 acres of forest directly impacted in the last 10 years, and a liberal, worst case projection of an additional 380,547 acres of forest impacted in the next 10 years, with no action. These impacts do not reflect any natural succession or reforestation efforts, that have occurred and will occur. Nonetheless, MTM/VF would result in fragmentation of the forests. The remaining forest patches may provide proper habitat to maintain the population of most of the states avian fauna; however, a few species may be put into peril because their core breeding area is within the heart of the future mountaintop mining area. Some scientists may make the value judgement that loss of these species may have more ecological importance than providing habitat for grassland species considered rare in the state.

Habitat changes will occur in the study area and these changes involve a shift from a forest dominated landscape to a fragmented landscape with more grassland habitat. This shift leads to a shift in the plants and animals of the ecosystem. For example, dry grassland species will dominate the once post-mined and forest harvested sites. This results in an overall reduction in the native woody flora, as well as a reduction in the spring herbs and other vegetative components characteristic to the study area. [Appendix E (Wood, et al, 2001; Handel, 2001)]

Wood and Edwards provide evidence that mine sites that were converted to grasslands after mountaintop mining provide habitat for a number of grassland bird species that are listed as rare in West Virginia [Appendix D]. These species are rare in West Virginia because grasslands are historically rare in the state [Strausbaugh and Core, 1997]. Providing habitat for species listed as rare may not be ecologically significant because these grassland species have substantial breeding habitat in other parts of the United States. The Dicksissel, Horned Lark, Eastern Meadow Lark, and Grasshopper Sparrow are grassland birds with breeding ranges outside of the study area.

As indicated in Chapter IV.C., Soils and Vegetation, the timely re-establishment of a quality forest community on reclaimed mine sites would not prevent the previously described impacts to terrestrial wildlife species. However, with the improvements in the ability to re-establish forests of similar species to those which existed prior to mining, the ability to re-establish wildlife communities similar to those which existed prior to mining would be enhanced. The cove-hardwood forest community is one exception that would not likely re-establish on mine sites, and it is equally unlikely that wildlife communities endemic to this type environment would return. In short, just as the time periods to re-establish similar forests are reduced, the time periods to re-establish similar wildlife communities would also diminish.

b. Wildlife Populations

Wildlife population is a measure for evolutionary change and functioning of ecosystems. However, population numbers alone do not adequately reflect the prospects for species or the continued performance of their ecological role. Information about life history and population dynamics, such as dispersion, fertility, recruitment, and mortality rates, is critical to identifying potential effects on population persistence and ecological processes. When populations are lost, the local adaptations of these populations are lost, the ecosystem functions performed by these populations cease, and ultimately species may go extinct. In general, the risk of losing populations (and with them ecological integrity) is greatest when populations are small, but even large populations may have critical components of their life histories of population cycles that make them especially vulnerable. (EPA, 1999)

Direct and indirect impacts of population dynamics affect headwater stream systems in the EIS study area. These biotic systems are characteristically in locations with high numbers of endemic macro invertebrates, amphibians and fish. Populations tend to be small and highly specialized in the headwaters environment. Species with these traits tend to be sensitive to relatively small changes in their environment (Stein et al., 2000). Some species in headwater streams may have distributions limited to only one or several watersheds. With such a small geographic range, fill activities from one mine may impact the entire population.

MTM/VF activities may impact population dynamics through indirect as well as direct impacts. For instance, changes in contaminants or in thermal regime may affect survivorship and reproduction and impact the number of individuals available for recruitment. An increase in base flow may eliminate intermittent flow areas serving as refuge for amphibians from fish predators. The loss of autochthonous input from timber harvesting may decrease the habitat types available and may impact reproductive success for some species. Finally, egg mortality may be affected by changes in flow and/or sedimentation. Many other impact producing factors in the study area may cause environmental changes that might result in altered population dynamics, including potential extirpation of some species. Although data are lacking on the magnitude of mining impacts compared to other alterations in land use, such as forestry, the MTM/VF impacts to complex population dynamics in headwater stream systems requires additional study to detail the impacts to this system in the study area.

Preservation of genetic diversity is critical to maintaining a reservoir of evolutionary potential for adaptation to future stresses. The genetic diversity of a species is a resource that cannot be replaced (Solbrig, 1991). Genetic diversity enables a population to respond to natural selection, helping it adapt to changes in selective regimes. Evidence indicates that a reduction of genetic diversity may increase the probability of extinction in populations. Many of the factors that affect genetic diversity have been discussed for population dynamics. Extirpating populations as well as species would result in decreases in genetic diversity in the study area. Direct filling of streams may reduce the numbers of individuals of rare and endemic species, thereby reducing its genetic diversity possibly to the point of extinct. Indirect impacts from mining through alterations in water chemistry, stream flow or the aquatic thermal regime may also negatively impact populations reducing genetic diversity.

However, determinations of this type of impact is highly site-specific and, as such, are beyond the ability of this document to evaluate. Identification of these endemic populations, and as appropriate, protection measures, would be developed on a case-by-case basis as MTM/VF proposals are submitted.

While all of these factors affecting wildlife populations were not studied, other studies for the EIS evaluated the abundance of wildlife on MTM/VF sites. Grassland birds will likely increase, while many forest interior, neo-tropical migrant species will suffer losses in numbers as a result of MTM/VF. Some also believe there may be an increase in game species such as whitetail deer and turkey due to an increase in the diversification of habitats.

The Potential Ecological Condition (PEC) is an index intended to assess the ecological integrity of watersheds based primarily on the extent of large scale human disturbance and forest cover. This index was developed under the premise that songbird community composition reflects ecosystem properties of concern such as structural complexity and landscape configuration. The results of the PEC metric calculated in the Cumulative Impact Study suggest that mountaintop mining may not have a significant impact on the biologic integrity of the terrestrial ecosystems in the study area [Appendix I (USEPA, 2002)].

Although, the Cumulative Impact Study suggests that ample forest will remain in the study area under the future conditions of the No Action Alternative and Alternatives 1, 2, and 3 to maintain relatively high PEC scores, adverse impacts from MTM/VF and logging to many forest interior bird species, such as those species with breeding ranges that are restricted to or confined mostly within the study area are still possible. Portions of core breeding ranges for the Louisiana waterthrush, worm-eating warbler, and cerulean warbler are within the the study area [http://www.mbr-pwrc.usgs.gov/bbs]. Disturbances associated with mountaintop mining could potentially adversely impact each of these species breeding ranges. Researchers have demonstrated that habitat loss does not have to be total to reduce wildlife populations. Many species are "area-sensitive" and require large blocks of habitat or have other special habitat requirements that maybe affected by MTM/VF operations. Although fragments of forest may remain after mining is complete in a previously forested area, certain area-sensitive forest birds (forest interior species) may be absent or their populations reduced.

The herpetofauna will likely undergo a shift from mesic favoring salamander dominated communities along the riparian corridors of the small headwater streams and in the litter of the forest floor to a snake-dominated grassland fauna. [Appendix D; Chapter III.F.7; Wood and Edwards, 2001]. Salamanders are an important ecological component in the mesic forests of the study area and are often the most abundant group of vertebrates in both biomass and number (Burton and Lykens, 1975; Hairston, 1987). Ecologically, salamanders are intimately associated with forest ecosystems, acting as predators of small invertebrates and serving as prey to larger predators (Pough, et al., 1987). Petranka (1993) presented a conservative estimate that there are about 10,000 salamanders per hectare (about 4,050 per acre) of mature forest floor in Eastern forests. A reduction in salamander populations may have negative impacts on the species that depend upon them in the food web.

c. Aquatic/Terrestrial Interface

Chapters III.C. and III.D. of this EIS describes biotic interactions common in headwater streams and various vertebrate species including birds, salamanders (including newts), and mammals which require interactions with the aquatic environment in order to maintain their life cycle. Biotic communities have been demonstrated to occur in the uppermost reaches of watersheds, even in ephemeral stream zones which flow only as a result of rain or snow melt. Under all alternatives, the biota in these reaches are at risk from valley fills. Filling would eliminate all aquatic and aquatic-dependant interactions that would formerly have occurred in the filled area. In areas downstream from fills, changes in the macroinvertebrate and fish communities have been observed (USEPA, 2000; Stauffer and Ferreri, 2002). Any change in community composition may impact the biotic interactions but these interactions were not studied as part of this EIS because they are often difficult to demonstrate.

Other human activities and development in the study area may cause environmental changes that would result in alterations or simplifications in biotic communities and associated biotic interactions. Although data are lacking on the magnitude of mining impacts compared to other alterations in land use such as forestry, the permanent nature of filling would suggest that MTM/VF impacts to biotic interactions in headwater stream systems, including interactions linking terrestrial biota to the aquatic environment, may constitute a irreversible impact to this system in the study area.

d. Fish Populations

According to Stauffer and Ferreri (2002), the EIS study area is unique and important in the evolution and speciation of North American freshwater fishes [Appendix D; Chapter III.]. Fifty-six species of fish, including two hybrid sunfishes, were collected within several watersheds in the EIS study area. The study determined that small headwater streams harbor populations with unique genetic diversity. These headwater stream populations have the greatest potential for natural selection processes that may result in development of new species/subspecies.

Comparison of the numbers of total species and benthic species on unmined sites and filled sites in Kentucky and in the New River Drainage indicate that MTM/VF has had an effect on the number and composition of the fish communities in these streams. Streams classified as filled had lower numbers of total species and benthic species than unmined streams in both areas.

e. Threatened and Endangered Species

Endangered, threatened, candidate, and special concern species known to inhabit the study area were identified through correspondence with the appropriate Kentucky, Tennessee, Virginia, and West Virginia state agencies and the FWS. Letters requesting T&E terrestrial species information were sent to the Kentucky Natural Resources and Environmental Protection Cabinet, the Tennessee Department of Environment and Conservation, Virginia Department of Conservation and Recreation, and the West Virginia Division of Natural Resources. Responses to these letters included lists of Federal and state listed threatened, endangered, and sensitive species broken down by county. These responses and habitat information are summarized in Appendix F of this EIS.

On September 24, 1996, the FWS concluded formal consultation with OSM pursuant to Section 7 of the ESA on MTM/VF operations conducted under state and Federal regulatory programs adopted under SMCRA and its implementing regulations. This programmatic consultation lead to the issuance by the FWS of a Biological Opinion (BO) and conference report that found surface coal mining and reclamation operations conducted in accordance with properly implemented state and Federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of designated or proposed critical habitats.

In addition to the SMCRA program coordination with FWS to implement the 1996 BO and ensure ESA compliance, the COE must consult with FWS on issuance of CWA Section 404 permits. FWS and OSM have also developed an endangered species training course to inform State regulatory agencies and OSM staff about the requirements of the ESA and the 1996 BO, and foster a cooperative working relationship. Implementing these ESA program controls serve to assure appropriate dealings T&E species and their critical habitat.

Currently, the Federal agencies are conducting informal consultation with FWS to determine the extent to which the proposed actions included in the preferred alternative may affect federally listed species or critical habitats that are in the EIS study area. EPA is in the process of writing a Biological Assessment (BA) that will identify Federally listed T&E species which are likely to be adversely affected by actions included in the preferred alternative. The BA under development for this EIS will consider the consequences of several of the Federally-listed T&E species cited in Appendix F that are found in some parts of the study area and that may be affected by MTM/VF. The initial list of species to be considered include the following:

Applachian monkeyface pearly mussel (*Quadrula sparsa*)
Birdwing pearly mussel (*Conradilla caelata*)
Blackside dace (*Phoxinus cumberlandensis*)
Clubshell (*Pleurobema clava*)
Cumberland bean pearly mussel (*Villosa trabalis*)
Cumberland combshell (*Epioblasma brevidens*)
Cumberland monkeyface pearly mussel (*Quadrula intermedia*)
Cumberland elktoe (*Alasmidonta atropurpurea)*
Dromedary pearly mussel (*Dromus dromus*)
Indiana bat (*Myotis sodalis*)
Little-wing pearly mussel (*Pegias fabula*)
Northern riffleshell (*Epioblasma torulosa rangiana*)
Oyster mussel (*Epioblasma capsaeformis*)
Pink mucket pearly mussel (*Toxolasma cylindrella*)
Purple bean (*Villosa perpurpurea*)
Rough rabbitsfoot (*Quadrula cylindrica strigillata*)
Shiney pigtoe (*Fusconaia cor (=edgariana)*)
Tan riffleshell (*Epioblasma florentina walkeri*)
Virginia Northern flying squirrel (*Glaucomys sabrinus fuscus*)

Although all of the listed T&E species in Appendix F will be considered in the BA, special attention will be given to the species listed above. Measures to avoid adversely affecting the Federally-listed species will be considered in the BA. Information about the findings of the BA and the informal consultation will be provided in the final EIS.

2. Consequences Common to Alternatives 1, 2, and 3

All three action alternatives provide for mitigation of functions lost by valley fills covering headwater streams. Mitigation provides opportunities to maintain and improve watershed health, provide for continued or renewed genetic diversity, and restoration of crucial aquatic/terrestrial interface.

The forest loss under the alternatives may be less because of the increased focus to reclaim post mined lands with trees [Chapter II.C.8; Actions 13 and 14]. Such future conditions under Alternatives 1, 2, and 3 would provide opportunity for maintaining the diverse avian fauna of the study area, while at the same time providing substantial breeding habitat for disjunct populations of the rare grassland species. Reforestation or creation of riparian zones as part of mitigation will also aid in restoring contributions of woody materials and leaves for macro invertebrates and downstream energy transport.

There are no significant differences among the No Action Alternative and Alternatives 1, 2, and 3 in terms of their ability to protect T&E species. However, the EIS contains provisional Action 17, should the BA, described above, identify particular measures are needed to fulfill ESA provisions [Chapter II.C.11; Action 17].

E. AIR QUALITY

As described in the Chapter III.V, potential air quality issues of airborne dust and fumes generally result from inhalation of particulate matter, fugitive dust, and re-entrained dust emanating from the mining operations and hauling. Direct impacts to air quality are localized within the immediate area of the mining site and are temporary in nature. Increased awareness of the dust emitted from hauling operations in recent years has improved air quality problems associated with hauling in the vicinity of the mining operations. Air quality programs are described in Chapter II.C.9 and Appendix B.

1. Consequences of the No Action and Action Alternatives

The environmental consequences of MTM/VF to air quality can be considered locally, regionally, and nationally. From the perspective of local consequences, fugitive dust and particulates, fumes released during blasting, and emissions from vehicles and machinery were considered. From a regional perspective, the cumulative effects of these impacts from nearby sources were considered. No irreversible and irretrievable impacts occur with this issue. The forty-two monitoring stations within the study area reported acceptable air quality for all criteria air pollutants in recent years, with the exception of ozone in Boyd and Greenup Counties, Kentucky.

EPA and the states are responsible for Clean Air Act (CAA) implementation regarding air quality [Chapter II.C.9.a.1]. The CAA is the comprehensive Federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. The development of state implementation plans (SIP's) applicable to appropriate industrial sources in the state are designed to attain and maintain applicable NAAQS.

The Federal government generally does not have the authority to regulate fugitive emissions that are not associated with a *permanent stationary source* [42 U.S.C. 7479]. Mountaintop mines are not permanent stationary sources; and, thus far, have not been considered to meet the criteria for *major source* air quality permits, i.e., defined for particulate matter as sources which emit at least 250 tons/year [42 U.S.C. 7661]. However, because the SIPs also were required to contain a permitting program for major and minor sources, fugitive emissions can be regulated under the state SIPs, state permitting programs, and select state regulations, depending upon the facility composition.

a. Fugitive Dust

Fugitive dust usually refers to the dust put into the atmosphere by the wind blowing over bare soil, plowed fields, dirt roads or desert or sandy areas with little or no vegetation. In the case of MTM/VF, re-entrained dust is temporarily put into the air by activities such as vehicles driving over dirt roads and dusty areas, excavation of overburden, and blasting. The emission rates of fugitive dusts are highly variable and dependent on the prevailing atmospheric conditions, including wind speed and direction.

Previous EPA studies have found that mining activities such as drilling, blasting, coal removal, haul trucks, material handling and storage, truck loading and unloading, and bulldozer activities cause dust. Both drilling and blasting emissions are considered to be small contributors to particulate matter emissions, in comparison with other sources of emissions in this category. The most significant sources of emissions for these types of activities are overburden removal and haul trucks. According to the EPA report, haulage can account for over 50% of the particulate emissions at surface mining sites. Bulldozer activities can also account for significant particulate emissions at levels (about 4% of the total emissions). Truck loading and unloading are considered to be minor contributors to overall emissions. (USEPA, 1991)

b. Respirable Dust

Particulate matter (PM) of concern for protection of lung health are the fine particles. PM in the form of respirable dust are particles with aerodynamic diameters less than 10 microns. This size of airborne dust is capable of entering the lungs if inhaled. According to the American Lung Association, particles of special concern are less than 2.5 microns in diameter. These particles are more easily inhaled than larger sized particles and can either become embedded deeply into the lungs or absorbed into the bloodstream. Inhalation of particulate matter air pollution is particularly harmful to sensitive members of the population who have pre-existing conditions such as asthma and chronic obstructive pulmonary disease. These particle sizes are typically of concern for workers on the mine site and regulated by the Occupational Health and Safety Administration and MSHA. Most particulates from surface coal mining and reclamation operations exceed 10 microns.

Emissions from blasting and drilling are minor contributors and are mostly a concern for the workforce. This is particularly true for drilling when the rock has significant crystalline silica content and the drill operators and helpers may be exposed to large amounts of respirable crystalline silica. Such exposure places these workers at high risk of silicosis. However, the high particulate concentrations associated with drilling affect a limited area and are generally not a concern for surrounding communities. In considering the impact upon communities, the major sources of emissions at surface mines involve scraper travel (not commonly used in Appalachia), overburden and coal removal (by drag lines, shovels, and loaders), truck haulage, and vehicle traffic. Vehicle traffic from and to mines may be a particular concern due to dispersal from the mine haulage roads and entrainment of the load due to improper or no load covering during travel from the mine to the preparation plant or loading terminal and return.

A limited study of the dust from surface mines is in Appendix G. The study found that dust transport following blasting occurred only over short distances. However, SMCRA regulatory agencies in the EIS study area have dealt with several citizens' complaints regarding dust from surface mining. In some cases, dust complaints may be beyond the scope of regulatory authority and present a nuisance. Citizens were recently successful in a West Virginia civil action regarding dust nuisance from a coal storage area on a surface mine.

c. Blasting Fumes

Potential health effects associated with surface mining operations include the potential inhalation of toxic fumes generated from the blasting operations. Blasting operations may involve the release of fumes including carbon monoxide, nitrogen dioxide, nitric oxide and ammonia. The type and amount of fumes released is dependent on the frequency and type of blasting operation conducted for the particular mining operation. According to research published by the National Institute for Occupational Safety and Health (NIOSH), over the past 30 years, blasters have switched to using less expensive blasting agents such as ammonium nitrate/fuel oil (ANFO) mixtures. Ammonia is released during this combustion process. Exposure to ammonia may cause eye and respiratory irritation. A study of blasting fumes performed in conjunction with the EIS found that fume transport did not extend beyond the permit boundary.

2. Consequences Common to Alternatives 1, 2, and 3

Each of the action alternatives includes an action proposal to evaluate current programs for controlling fugitive dust and blasting fumes from mountaintop mining/valley fill operations, and develop BMPs and/or additional regulatory controls to minimize adverse effects, as appropriate. Under this action, meteorological and physical conditions which can exacerbate dust or blasting fumes, state-of-the-art techniques currently used in the mining industry to control dust and fumes, and appropriate regulatory improvements that can be implemented to monitor and control emissions would be identified.

Under the action alternatives, surface coal mining operators would have access to a central source for state-of-the-art information on techniques to control air quality problems that may not be available under the No Action Alternative. This information, if utilized in the day-to-day operations, could reduce the potential for or, in some cases, eliminate citizen complaints regarding dust and blasting fumes. The action also considers the development of additional regulatory controls, as appropriate to minimize adverse effects. While operators may not embrace the BMPs in the action alternatives, the presence of information, coupled with encouragement to utilize the practices by the regulatory authorities when air quality issues arise, have greater potential to minimize adverse effects.

F. ENERGY, NATURAL, OR DEPLETABLE RESOURCE REQUIREMENTS

The surface mining of coal involves an irreversible commitment of resources. As the coal is mined and placed into commerce for energy or metallurgical production, this resource is not renewable and the remaining coal reserves are finite. On the other hand, surface mining is a temporary use of the land and, with proper mining and reclamation techniques, the land is not irretrievable for a variety of future land uses.

The three action alternatives and the No Action Alternative may also provide significant environmental benefit, if mitigation proves infeasible in certain locations, causing no mining to occur. If fill minimization/mitigation is difficult or impossible because of the application of the CWA 404(b)(1) Guidelines some coal reserves may not be minable. If coal resources in the study area are rendered economically unrecoverable, they may never be mined or not be mined until coal market conditions or mining/reclamation technology provides means to develop the resource in compliance with applicable state and Federal regulatory requirements. Some limited number of reserves may be recoverable by underground mining or a combination of contour and auger/highwall mining. Such types of underground or surface coal mining techniques do not recover as much of the resource a larger-scale surface area or mountaintop removal mining methods.

Coal mining provides over 50% of the electrical generation capacity for the nation, and, in states within the EIS study area, more than 90% of electricity comes from Appalachian coal. Nevertheless, resources in U.S. coal basins within or outside of Appalachia and in other countries exist to offset lost reserves from the study area, if market conditions change for regulatory or other reasons. However, economic impacts resulting from decreased coal mining, could be locally significant [Chapter IV.I.].

Precise estimates of the magnitude of change anticipated from regulatory actions impacting mineral economics are difficult to calculate. The difficulty occurs because the decision of when and where remaining coal reserves may be mined is controlled by numerous complicated factors, such as mineral and surface ownership, market demands for particular coal quality, and the availability of investment capital, equipment, labor, etc. Also, the amount and location of remaining reserves presents various alternatives for future mining and the impact of regulatory costs are highly site specific. To perform such an analysis would require detailed analysis of all remaining minable properties. It is not practical to analyze on that scale and creation of reliable resource maps on any scale is cost prohibitive.

G. CULTURAL, HISTORIC, AND VISUAL RESOURCES

Cultural, historic, and visual resources are discussed in Chapter III.P, R, S, T, and U. Cultural resources are the fragile and non-renewable remains of human activity. They are found in sites, districts, buildings, and artifacts that are important in past and present human events. Cultural resources are arbitrarily divided into historic and prehistoric cultural properties and traditional "way of life" (lifeway) values, although they are part of a continuum of human use and occupation of the land.

A traditional lifeway value is important for maintaining a traditional system of cultural practice, religious belief, or social interaction for a contemporary ethnic or cultural community. Shared traditional lifeway values are abstract, nonmaterial, ascribed ideas that cannot be discovered except through discussions with members of the particular group. Lifeway values may or may not be closely associated with narrowly-defined locations. The Library of Congress provides an online collection for West Virginia which includes extensive interviews on native forest species and the seasonal round of traditional harvesting (including spring greens; summer berries and fish; and fall nuts, roots such as ginseng, fruits, and game). The information documents community cultural events, such as storytelling, baptisms in the river, cemetery customs, and the spring "ramp" feasts using the wild leek native to the region. Interpretive texts outline the social, historical, economic, environmental, and cultural contexts of community life, while a series of maps and a diagram depicting the seasonal round of community activities provide special access to collection materials [http://memory.loc.gov/ammem/cmnshtml/cmnshome.html]

Forests provide the basis for a multi-billion dollar timber industry and are a vital part of the cultural heritage of the region. Many plants found in the forest have contributed to the region's remarkable culture. Herbs such as ginseng are used globally for medicinal purposes, and are harvested to support a local non-timber forest industry. As isolated mountain hollows fostered the evolution of rich species diversity, they helped to preserve cultural heritage and create a sense of self-reliance and independence within the people. [CVI, 2002]

This EIS study area is part of the Mid-Atlantic Highlands region that features some of the most historic landscapes in the country. Native American populations existed 15,000 years prior to arrival of ancestors of the citizens living in the study area today. Indian artifacts, burial mounds, camp sites, and related archaeological sites are scattered in the study area, most significantly in the larger floodplain valleys. Many battles of the Civil War were fought in the Appalachian countryside and pre- and post-Civil War structures and encampments may occur in some locations within the study area.

Following the crossing of the mountains by early settlers, towns and cities formed along the river valleys and became significant centers for trade and industry. Before the discovery of coal, salt brines, oil and gas, timber, glass making and other farming and trading developed the local economies. Settlers began dispersing to other ridge tops and stream valleys surrounding the towns and cities. With the discovery of coal, large land holdings were purchased for rich mineral rights (coal, oil, gas, etc.). During the industrial revolution, the demand for coal for coke and steam began to draw mining employees into coal camps. These coal camps formed the cultural and social hubs for Appalachian residents up through the first half of the twentieth century and are still the roots for many of the inhabitants today. These coal camps and the large land holdings have tended to control the cultural and historical resources in the region.

Coal mining practices have profoundly affected the communities and residents of the Appalachian coalfields since coal mining first commenced in the region. Sections III.U.1. through III.U.4. provide an overview of the past and current interaction between the coal mining industry and the residents of Appalachia. A decline in the physical state of the community may affect the economic status of local residents. Coal companies frequently built and maintained local infrastructure, from housing to plumbing and even churches, in the coal towns of Appalachia in varying degrees of quality. Today, many coalfield communities not only receive revenue from taxes on coal property and employment, but also donations of money, land, and company equipment to support civic organizations.

Appalachian coalfield residents have a unique social and cultural connection to the natural environment. For coalfield residents, the quality of the natural environment is important both as a source of income and an integral element of Appalachian culture. Sections III.U.5. and III. U.6. present an overview of the relationship between the natural environment, Appalachian culture, and coal mining. Mining effects may compound and ultimately affect the human environment in ways such as land use and potential development, as described in Chapter III.S.; historic and archaeological resources, as described in Chapter III.T.; and the cultural, social, and economic importance of existing landscape and environmental quality, as described in Chapter III.U.

The value of prehistoric and historic properties is intrinsic and may be protected or documented under the National Historic Preservation Act (NHPA). Their preservation may stabilize neighborhoods, stimulate private investment, provide affordable housing, revitalize downtown activities, attract tourists and enhance community pride. If MTM/VF projects may impact historic properties, the projects are coordinated with the State Historic Preservation Office (SHPO). The mission of the SHPO is to encourage, inform, support, and participate in the efforts of people of the state to identify, recognize, preserve and protect prehistoric and historic structures, objects and sites.

The aesthetic quality of a community is composed of visual resources; i.e., those physical characteristics that make up the visible landscape, including land, water, vegetation and manmade features. Visual impacts affect communities from two perspectives: 1) the view from the site, and 2) the view of the site. The view from the site is from the public perspective and leaves a lasting impression of the community, are or regional on the visitor as well as residents. The view of the site by the residents contributes to the feeling of community value and pride. Visual impacts of an area are ascertained by defining the visual environment, identifying key views, analyzing the resources and community responses, depicting the project appearance, assessing the visual impacts, and then developing mitigation measures.

1. Consequences Common to the No Action and Alternatives 1, 2 and 3

Under all four alternatives, local setting for cultural, historic, and visual resources continue to be at risk from MTM/VF activities that may result in a potential impact to those resources. Coordination with the SHPO on impacts to prehistoric and historic properties will provide mitigation in the form of permanent documentation. However, existing controls are judged adequate to protect cultural and historic resources. No distinction can be made between the No Action Alternative and the three action alternatives as they affect cultural, historic, and visual resources in the EIS study area.

All alternatives may continue to displace local communities in essentially equal amounts, since the alternatives are based on process differences and not directly on measures that restrict the area of mining. However as review processes are improved and enhanced, there should be a greater level of consideration of cultural, historic and visual resources.

Visual impacts will continue to occur, both from MTM/VF, as well as other activities such as roads, and residential/commercial development. These impacts occur to residents and visitors in the form of changes to the viewscape as seen from highways and impacts seen from air travel. Mitigation for these impacts may occur in the form of reforestation in some instances, however, some visual impacts may be permanent due to post-mining development.

As communities are displaced for whatever reason, including MTM/VF, local crafts, skills, and folk lore may be diminished and may be lost. However, all alternatives will produce indistinguishable indirect impacts in this regard.

H. SOCIAL CONDITIONS

From 1980 to 1990, the total population of the counties in the study area fell by over 140,000, from 2.11 million to 1.97 million, a 6.7% decrease. In contrast, the population of each of the states, with the exception of West Virginia, grew over this period. Regarding West Virginia, the study area counties lost population at a substantially greater rate than the state overall, 1.4 percent per year compared to 0.7% per year for the state. Census estimates for 1998 indicate that the study area's population levels have slightly rebounded to total 2,014,466. Tennessee is the only State in which the study area counties have regained their 1980 population. Total population in the West Virginia study area has declined from 1990-1998, although at a slower rate than the previous decade. [Chapter III.P]

Income statistics from the 1980 and 1990 Censuses indicate that the study area, as a whole, has a starkly lower income than the individual states. Just 4 of the 69 study area counties had a per capita income exceeding its state average per capita income in 1990. Another measure of economic well-being is the estimated percentage of the population with an income below the poverty level. Census statistics for 1980 and 1990 depict a poverty problem throughout most of the EIS study area. Over the entire study area, only four of the counties had a lower poverty rate than their respective state and only ten had a poverty rate below twenty percent in 1990. In twenty-four of the study area counties, over one in every three residents was estimated to live below the poverty level. The demographics in the EIS study area are discussed in detail in Chapter III.P.

Traditionally, many employment opportunities in the EIS study area have been in mining, forestry, and agriculture sectors; and industries requiring neither major urban centers nor knowledge in areas such as advanced computer technology. These industries have now declined, or have phased out workers through increased mechanization and operational efficient. [CVI, 2002] The study area counties nearly all show decreases in unemployment rates from 1990 to 1998, and many of the counties show greater improvements than their state average for the period. On the other hand, many study area counties had increases in unemployment rates for the preceding period (1980-1990), or had slower improvements than the state average. Taken together, the changes for the two periods suggest that the study area counties lagged the states in the 1980's in employment improvements and have begun "catching up" in the 1990's. [Chapter III.Q.] The persistence of high employment in the more isolated areas suggested that new and growing industries are not being attracted to take advantage of the available labor force [CVI, 2002].

Coal mining practices have profoundly affected the communities and residents of the Appalachian coalfields since coal mining first commenced in the region. Chapters III.U.1. through III.U.4. provide an overview of the past and current interaction between the coal mining industry and the residents of Appalachia. Appalachian coalfield residents have a unique social and cultural connection to the natural environment. For coalfield residents, the quality of the natural environment is important both as a source of income and an integral element of Appalachian culture. Chapters III.U.5. and III. U.6. present an overview of the relationship between the natural environment, Appalachian culture, and coal mining. Activities directly related to coal mining other than employment, such as increased traffic, air and water quality impacts, flooding and changes in the natural environment, affect the socio-economic conditions in the EIS study area. Because of the topography and terrain in steep slope Appalachia, flooding occurs in severe weather conditions. The environmental affects of flooding are described in Chapter III.G., and the air quality impacts can be found in Chapters III.V. and III.W. and Appendix G.

While company towns existed in many parts of the United States in the first half of the 20th century, the effects of coal company towns in the Appalachian Mountains were more far reaching. The mining company controlled nearly every essential aspect of community life, from work, to shopping, education, retail merchandising, and medical care.

The social structure of these company towns was impacted by the paternalistic nature of the relationship between the company and the residents, resulting in a highly dependent relationship for the residents. Research indicates that this typical company town relationship has both psychological and physical manifestations. The nature of company towns has been documented across numerous industries; however, the relative isolation of the communities, the predominance of the coal industry and the relative poverty of the region prior to industrialization all arguably contribute to a more pronounced community structure based on company paternalism.

The economic dependence of the region on its exhaustible coal resources, its need to diversify, and its need to further develop the human resources and infrastructure to support economic development are widely recognized. Most leaders are also keenly aware that its coal resources are its best source of leverage for investments needed to build an economy that can continue to flourish after the inevitable decline of coal mining [Chapter III.R.].

Two of the factors most often cited as hindering economic development in Central Appalachia are the rugged terrain and the poor access. The steep slopes and the narrow, flood-prone river valleys severely constrain the available supply of developable land. The use of land after coal mining has been completed may include residential and/or commercial development. Building on and use of this relatively rare flat land could provide jobs from construction, service and commercial industries, and tourism. Changes in land uses not only affect the local social climate and tax base, but affect private property rights as lands are developed and sold.

Changes in terrestrial and aquatic habitats will affect activities such as hunting, fishing, and bird watching. The recreation use of the area by residents and tourists is discussed in Chapter IV.J.

1. Impacts Common to the No Action and Alternatives 1, 2 and 3

The environmental consequences discussed throughout Chapter IV would have an effect on the social conditions of the area. Impacts to aquatic resources affect drinking water and fisheries, impacts to terrestrial resources affects land use and development, viewsheds, wildlife use and recreation which all have a bearing on social and cultural impacts. Requiring avoidance of high quality aquatic habitats and adequate mitigation, will improve water quality in the watersheds. Mining practices affect the local culture and directly impact the economy through employment opportunities. The number of mining jobs is related to the amount of coal produced. Coal-related jobs will likely be lost as the existing coal reserves are depleted and/or if coal mining productivity increases. [Appendix G; Chapter III.P-Q]

The agencies recognize that, in spite of enforcement of the existing regulations and implementation of the recent program improvements, blasting concerns/complaints will continue. Concerns and subsequent complaints are likely to decrease as a result of the identified recent program improvements. However, when mountaintop mining operations are near residences and populated areas, complaints, particularly those related to noise and vibration of homes (nuisance impacts), may still occur in relatively high numbers. Although regulations provide a limited ability to control nuisance impacts (for example blasting may typically occur only between sunrise and sunset), these nuisance-type concerns will continue to have periodic adverse effects on the quality of life of residents living in close proximity to the mine sites. The regulations were designed to minimize damage potential and only indirectly address nuisance; however, citizens may exercise their right to take civil action against a mining operation for nuisance-related concerns. There have been court cases in the coalfields where mining activities have been ordered to adjust operational procedures (i.e., above-and-beyond existing regulatory program controls) to reduce nuisance.

2. Impacts Common to Alternatives 1, 2, and 3

The actions in the three action alternatives are projected to have positive social benefits through the improved regulatory processes and coordinated public participation. All three action alternatives would facilitate a better understanding by the public of the regulatory process and therefore facilitate their input regarding social concerns that should be factored in permit decision making. This improved efficiency would result in mining companies having more predictability in their planning processes, resulting in reduced costs and time. The No Action Alternative would continue the existing regulatory framework.

Additional water quality data collection and analysis may result in new water quality standards, if necessary. Development of BMPs to centralize the best technical information for aquatic mitigation and reforestation [Chapters II.C.6 and II.C.8.], as well as the two actions discussed below, will provide predictability and better understanding for residents in the area of the effects of MTM/VF.

Implementation of Action 15 [Chapter II.C.9.] to evaluate and coordinate current programs for controlling fugitive dust and blasting fumes from MTM/VF operations, and develop BMPs and/or additional regulatory controls to minimize adverse effects, as appropriate. Under this action, EPA, OSM, state air quality agencies, and state mining agencies would identify 1) meteorological and physical conditions which can exacerbate dust or blasting fumes; 2) state-of-the-art techniques currently used in the mining industry to control dust and fumes; and 3) appropriate regulatory improvements to minimize adverse affects, as appropriate. This action could result in positive changes in operations to control air quality impacts near MTM/VF that may address social concerns.

Implementation of Action 16 [Chapter II.C.10.b.] would result in the identification of guidelines and methodologies for calculating peak discharges and evaluating downstream flooding risk. Modeling and other recommended approaches for peak runoff determinations could be discussed and the proper design storm event for evaluation could be suggested. This action would result in improved designs to reduce the risk of flooding to homes and businesses downstream of MTM/VF operations.

Since all of these actions would be implemented in Alternatives 1, 2, or 3, no distinction can be made between and among these alternatives as they affect social impacts.

I. ECONOMIC CONDITIONS

1. The Role of Coal in the Economy

The interaction of coal in the economy is driven directly by the energy market of the nation. Reliable, inexpensive energy is a crucial component to local, regional, national, and world economies. Setting public policy to balance environmental protection and energy needs is not a simple matter for Congress, the agencies implementing Federal law, state legislatures, or state agencies implementing state or Federal law. Normal supply and demand principles govern the energy market. For instance, the type of coal needed to comply with the Clean Air Act also influences demand. If a certain type of coal is required to meet clean air requirements and is more expensive to mine, then the cost of electricity to consumers will go up.

As long as coal is required to supply a dominant portion of local and national energy needs, the ability to extract low sulfur coal reserves efficiently and cost-effectively will occur somewhere in the nation (or the world) to meet energy demands and clean air standards. Higher mining costs due, in part, to environmental compliance (e.g., material handling, costs of mitigation, less-efficient mining methods to minimize impacts, inaccessibility of large reserves due to impact avoidance, etc.), will result in coal supplies originating from coal basins outside this EIS study area where compliance can occur. If mining costs increase too greatly within the EIS study area, mining employment would drop and tax revenue from coal would decline. Commensurate school closings, diminished state and local government services, etc. would occur. A shift to other industries (such as services, tourism, outdoor recreation, etc.) and some exodus of job-seekers to other regions of the country would occur if lower-salaried jobs are the dominant source of employment. The remaining population in the coalfields may be older and poorer as this long-term transition from coal occurs until or if other sources of employment, revenue, etc. supplant coal economic influences. This process is similar to what has occurred in other parts of the country as the steel industry declined due to foreign competition. These economic shifts have been repeated locally in numerous instances when employers or a primary industry sector decline, go out of business, or move.

If the reliance of the U.S. on coal for electricity is not supplanted by other fuel sources (gas, wind, solar, nuclear, fuel cells, other new technologies), the demand for central Appalachian coal will likely increase at some point in the future. This demand will occur as other low sulfur coal resources in the country diminish and/or more cost-effective and/or “environmentally-friendly” mining techniques are developed. Renewed demand might require more costly mining and more costly electricity with subsequent ripples in the economy as the loss of inexpensive energy influences other industrial sectors.

Central Appalachian coal currently meets air quality standards but cannot compete very effectively with Powder River Basin coal due to mining costs, reserve size, and economies of scale. Productivity increases in central Appalachia spurred by competitive pressure leaves thin profit margins and little attraction of investment capital. Additional costs of environmental compliance will undoubtedly shift some portion of production demands for compliance coal outside of the EIS study area.

Increased environmental costs due to avoidance, fill minimization, and compensatory mitigation to offset unavoidable aquatic impacts have not been a consistent factor in environmental compliance in the EIS study area until the 2002 renewal of NWP 21. These increased costs, discussed in the next section, will push mining companies, if possible, to try and avoid streams and find other places to place excess spoil—or, to “high-grade” already dwindling reserves in order to meet demand. However, even this shift in approach will be difficult, because some segment of the coal industry has capital tied up in larger equipment that cannot economically mine with smaller fills or longer haulage distances. New capital will be required to "re-tool" in order to conduct more contour/auger mining to reduce valley fill sizes, lower mitigation costs, and still meet coal market demand. These requirements could be difficult for some companies to fulfill and these companies may not be able to secure capital for new equipment, open new mines, or exploit existing reserves.

The influence of coal mining on the central Appalachian economy, including income, employment, and tax base, is discussed briefly below and in more detail in Chapter III.Q. Coal mining earnings within West Virginia are 5 % of total state income (3% of employment); just over 1% of total earnings and employment in Kentucky, and less than 1% of employment and income in Virginia and Tennessee [Chapter III.Q.2.a-b.]. While the coal mining influence state-wide is a relatively low percent of employment and income, it is a considerable influence in certain study area counties. For instance, coal-related earnings have the highest influence in Boone County, West Virginia, Buchanan County, Virginia, and Knott County, Kentucky, where coal-related earning comprise 60, 33, and 42% of county earnings, respectively. Surface mining employment study area wide represents 25% of mining employment, but declines in surface mining production typically result in some amount of commensurate increases in underground production and employment. Shifts in coal mining employment or production in counties with higher percentages of mining earnings can have proportionate effects on the county tax base [Chapter III.Q.2.c]. In West Virginia, for example, 34% of property taxes collected come from coal. Schools rely on these property taxes to supply around 30% of district budgets.

2. Economic Effects of Smaller Valley Fills or Alternatives to Fills

Excess spoil disposal is most cost-effective for a MTM/VF operation at a point as close to overburden removal as possible. Valley fill site selection reflects this factor. Abandoned mine benches, reclaimed mine sites, or active mining areas may accommodate some volume of excess spoil, reducing the size of valley fill sites. However, haulage and material handling costs somewhat limit the practicality of using these storage alternatives to valley fills. As required by the CWA Section 404(b)(1) Guidelines, an applicant must demonstrate that alternatives to valley fills and minimized valley fills have been considered in order to properly balance practicality with project purposes.

It is noted that costs of compliance with statutory performance standards and regulatory requirements are not a basis for relaxing the standards to accomplish any particular MTM/VF project. These types of costs were projected in documents prepared as part of other CWA and SMCRA regulatory implementation and are not restated in detail here. Such costs are only generally relevant to this EIS because the alternatives look at different ways to coordinate decision making, not different ways to meet existing regulatory requirements. Implementation of any future agency action proposed by the EIS, upon filing of a record of decision following the final EIS, will include independent NEPA, legal, and regulatory analysis of the relevant economic consequences of the action. Studies related to the impacts of restricting valley fill size on production, employment, and electricity costs are in Appendix G. Avoidance and fill minimization requirements of the existing CWA Section 404 program may present the most cost-sensitive economic influence to mining costs. Therefore, generalized or relative costs associated with the compliance are illustrated in this section for consideration by the decision makers in light of other costs that could be associated with actions considered in the EIS.

While the economic studies on the projected effects of valley fill restriction in Appendix G are subject to some limitations and do not directly relate to the alternatives analyzed as part of this EIS, they indicate that valley fill size is an important determinant of mining feasibility. The existing program and the alternatives proposed in this EIS contain the common requirement that an applicant must avoid headwater streams and minimize valley fills where avoidance is not possible. Therefore, the studies in Appendix G provide indirect indications of the roll that avoidance and fill minimization may play in selection of mining methods, equipment, and the exploitation of the remaining surface coal reserves.

These studies are based on the mining engineering consideration of the number of cubic yards (cy) of overburden material removed per ton of coal recovered to determine mining feasibility (overburden ratio). Larger equipment can move more cubic yards of overburden less expensively than can smaller equipment. Accordingly, drag lines can reach deeper coal reserves than can truck-and-shovel equipment, which can reach deeper coal reserves than truck-and-loader equipment. Similarly, higher overburden ratios may create proportionately greater amounts of excess spoil. Therefore, operations mining larger or deeper reserves may require larger fills to accommodate the excess spoil. Reduction of available fill space may entail use of different equipment, alternative backfilling and grading plans, and/or result in incomplete recovery. Such differences in available excess spoil storage can adversely affect mining costs and production. Information relative to these differences and discussions on mining methods, planning/feasibility, excess spoil disposal, and reclamation are provided in Chapter III.I, J., K., and L. Economic influences due to available valley fill storage are briefly discussed below.

It is reasonable to presume that required mitigation costs (i.e., to offset valley fills) will result in future MTM designs with reduced valley fill sizes. The economic studies in Appendix G evaluated absolute fill restrictions to specific watershed sizes. While some of the studies have limitations, explained in the cover sheet for Appendix G, they still provide a logical and parallel inference for potential general economic effects of fill minimization. That is, since some of the economic studies show that absolute fill restrictions increase mining costs due to additional material handling and use of different equipment, it can be inferred that minimizing fills will to some degree also affect mining costs.

The economics studies show a direct correlation between fill size and shifts in production due to increased mining costs. The Mining Technical Team Study projected, with fills limited to ephemeral streams, that 91% of reserves that were feasible for mining with larger fills could not be mined with smaller fills. The Hill & Associates sensitivity analysis projected reserve reductions of 22 and 45% as well as mining cost increases of around 8 and 14%, when all fills were restricted to 250- and 75-acre watersheds, respectively. The Hill & Associates studies generally concluded that smaller fills necessitate less complete extraction but more rapid depletion of the surface minable reserve base with different equipment types and a shift to underground coal production. The shift to underground production does not generally involve extraction of coal rendered unminable by surface mining fill restrictions.

For the same reason that the EIS supports case-by-case determination of fill number, size, and location for MTM/VF proposals, the actual mining cost increases and reserve reductions for any given mineral property could vary from these ranges. However, these studies clearly confirm the intuitive relationships among inexpensive excess spoil disposal, mining costs, minable reserve reductions and mining viability.

Where mitigation presents significant costs to the applicant, the economic effect will likely be similar, but possibly less pronounced, to the results of the absolute fill restriction studies, inasmuch as mining methods that reduce the amount of excess spoil (and consequently reduce the size of fills and the amount of mitigation) will be selected. The effects on individual MTM/VF projects may be less pronounced than the study results because of the following:

- Projects may result in fills larger than the restrictions analyzed
- Site-specific costs, such as the following, may differ from the generalized study assumptions:
    - Varying combinations of equipment may be used
    - Material handling or haulage may be markedly different.

Mining methods resulting in smaller fills can cost more than mining methods supported by larger fills. As described above, this occurs due to a lower coal recovery per volume of overburden removed as smaller equipment types are utilized. Also, resource recovery at operations with smaller fills may be less complete than operations necessitating larger fills. This effect occurs when portions of coal seams that were economically minable by larger equipment cannot be mined (and may never be extracted) by operations using smaller surface equipment or underground equipment.

Mining decisions are also strongly influenced by market demand for particular coal quality. Many mines rely on blending the products of different surface mines or a combination of surface and underground coal to conform with supply contracts for particular coal quality. Also, transportation and coal preparation costs associated with smaller and underground mines are sometimes related to the proximity of larger mines with this existing infrastructure. If the infrastructure is not available, a new, smaller mine may not be practical. Therefore, the types and qualities of coal reserves available in various seams, transportation, and coal cleaning facilities may determine mining viability.

The alternatives proposed in this EIS also include other actions that could increase costs of MTM/VF application preparation and operation. The alternatives propose actions that would increase data collection and analysis costs to the applicant as well as application scrutiny and intra-agency coordination costs to the agency. These costs are discussed below.

3. Economic Consequences of the No Action Alternative

a. Government Efficiency and Coordinated Decision Making

Under the No Action Alternative, the SMCRA agency permit application review process and decision typically start and conclude prior to decisions by the COE and state CWA Section 401 certification. Therefore, the SMCRA review and surface mine design is finalized without early input from COE experts on protecting aquatic values within waters of the U.S., or by state experts on protecting water quality. This type of input at the conclusion of the process often requires modification of the issued SMCRA permit and/or re-design of the mine to accommodate the decision of the COE. This occurrence can add substantially to the time and resources already expended by the applicant in fulfilling added SMCRA and NPDES reviews. In Virginia and West Virginia, the SMCRA and CWA Section 402 authority rest within the same governmental department and coordination regarding water quality protection in these states would continue.

The COE begins its CWA Section 404 review only after issuance of the SMCRA permit under the No Action Alternative. Because the surface mining operation has been designed to reflect comprehensive SMCRA review, there is pressure on the COE to work within the existing design so as to not significantly alter the mine plan--unless egregious adverse environmental effects would occur. However, there could likely be instances under the No Action alternative where SMCRA-approved projects would require redesign and reprocessing due to COE reviews. This causes increased permitting costs for the applicant and additional SMCRA agency resources to process modifications, revisions, or amendment of previously-issued permits.

b. Data Collection and Analysis

The No Action Alternative could result in increased costs to applicants as the new NWP 21 requirements are implemented. Increased stream characteristic information, impact projections, and demonstrations that impacts to waters of the United States have been avoided and minimized to the maximum extent practicable, and that compensatory mitigation is offered to offset unavoidable aquatic impacts will add field work, laboratory analysis, engineering computations, and likely more elaborate project designs. In the COE Draft Nationwide Permits Programmatic EIS (July 2001), the COE estimated that the cost to the applicant for CWA Section 404 permit is approximately $12,500 higher for an IP than for a NWP [2001 COE DEIS, Table D.4.2-4]. If the level of permitting remains constant in the No Action alternative, the overall increased cost to applicants would range from $1.6 to $1.9 million per year. There was recently an increase of permit applications for renewal of NWP 21 projects following renewal of NWPs in January 2001. These applications occurred for MTM/VF operations not yet initiated since their earlier authorizations expired in February 2003. Thus, the projected costs to applicants may initially be greater until the permit renewals are processed.

c. Consistent Definitions

Without common application of regulatory terms regarding streams [Chapter II.C., Action 2], there is the potential for less effective environmental protection and confusing regulatory responses to citizen concerns. This alternative could ultimately result in increased costs to the public and the regulatory agencies in the form of litigation.

The No Action Alternative is also likely to be more costly to the regulated community due to increased permitting costs associated with resolving conflicting requirements, time delays associated with obtaining the necessary permits to legally conduct mining activities, and potential litigation costs. These delays could occur, for example, when a project is planned in areas where stream characteristics are at issue. Costs of obtaining additional field data to resolve the issues could also accrue.

d. Mitigation

Action 10 is common to Alternatives 1, 2, and 3 and proposes to assure compensatory mitigation through coordination of SMCRA and CWA bonding and inspection. Mitigation under the No Action and action alternatives are discussed in Chapter II.D.6. The No Action Alternative provides no coordination regarding who monitors implementation of mitigation requirements and how mitigation projects are bonded and insured to assure successful completion. Under the No Action Alternative, any disturbances that might occur within the SMCRA permit boundaries would be inspected and bonded by the SMCRA regulatory agency to assure completion of required activities. SMCRA also requires the applicant/permittee to maintain liability insurance during the life of the permit and bond liability period in order to assure that anyone who might be harmed by the proposed activities has a viable opportunity to be made whole through civil court action.

CWA mitigation actions that may be required off-site (beyond the SMCRA permit boundaries) are under the regulatory control of the COE. The COE can, on a case-by-case basis, require performance bonding for mitigation activities. However, COE has no authority to require that permittee or contractors performing such mitigation activities have liability insurance coverage. Under Section 401 of the CWA some states, such as West Virginia, have established mitigation authorities to offset impacts to waters of the state. The COE considers these mitigation plans when evaluating mitigation proposals to satisfy requirements under CWA Section 404.

Since there are no defined, established procedures between COE and SMCRA authorities for coordinating on-site and off-site mitigation requirements such as bonding and inspection, there are both inefficiencies and risk in the current system. The risk is that in maintaining separate, uncoordinated systems, some aspects of a mitigation project may not be completed as required. The inefficiencies are present as the current system now requires separate permitting, separate monitoring/inspection, and separate bonds for what is essentially a single project (reclamation/mitigation). The environment may be impacted should any aspect of a mitigation project not occur. Duplication of permitting, inspection and bonding requirements result in increased costs to both the taxpayer (duplicate permitting and inspection staffs) and to the applicant (duplicate permitting and bonding costs).

e. Flooding

Flooding can adversely impact people, property, public transportation, and utilities. Flooding exacts considerable costs to individuals, insurance companies, as well as local, state and Federal governments. The causes of flooding may be a combination of the rainfall event and the man made alterations to land use, topography, ground cover, and stream channels. Human alterations to the landscape can also prevent or minimize flooding impacts [Chapter III.G]. Technical studies for this EIS indicate that peak runoff will typically increase during and shortly after mining on most sites. This may not be true of all mine sites and reclaimed sites may reduce peak flows compared to pre-mining conditions [Appendix H]. Alternatives 1, 2, and 3 contain an action to develop guidelines for calculating peak discharges for design precipitation events and evaluating flood risk [Chapter II.C.10]. In addition, the guidelines would recommend engineering techniques useful in minimizing the risk of flooding [Action 16].

With regards to the No Action Alternative, the study findings generally support a conclusion that downstream flooding potential is not significantly increased by existing mining practices so long as approved drainage control plans are properly applied [Appendix H]. However, variability in the results suggests that this assumption cannot be universally applied, and that only site-specific quantitative modeling can determine whether potential for flooding is present for a given mine plan. Absent selection of an action alternative, permit reviews would continue to be evaluated in differing fashion from state to state by SMCRA agencies and COE Districts.

West Virginia currently uses the Surface Water Runoff Analysis (SWROA) guidelines, developed jointly with the COE and OSM [http://www.dep.state.wv.us/docs/28surfacewater.doc]. Kentucky advises permitting staff on general considerations for flooding potential assessments through a policy memo. The COE Huntington District evaluates flooding potential for each applicant based on a 100-year storm, while SMCRA evaluations may use a 25-year storm for some designs and 100-year storms for others. The COE Louisville District reported that no flooding evaluations occurred as part of their NWP 21 reviews. Application of these flooding analyses imposes increased analytical costs to applicants and administrative costs of review to the regulators. Mitigation measures as part of the mine plan result in added costs to the mining companies. The cost-benefit of these analyses should likely exceed the necessity of repairing flood damage absent the measures.

Recent flooding in West Virginia during 2001 and 2002, and the types of flooding analyses described above, resulted in the West Virginia Governor commissioning a study and OSM conducting oversight. Recommendations from OSM reviews could bring consistency to SMCRA programs under the No Action Alternative. However, the No Action Alternative would not necessarily resolve the differing approaches to flooding potential reviews by OSM and the COE. If quantitative analyses continued to be omitted in some states under the No Action Alternative, the risk would continue that some mine plans with increased potential for downstream flooding would be overlooked during the permit review process. If contributions to flooding from surface coal mining occur, flooding recovery costs could be imposed on operators, residents, state, local, or Federal governments.

4. Economic Consequences Common to the No Action and Alternatives 1, 2, and 3

a. Fill Minimization

The alternatives analyzed as part of this EIS, including the No Action Alternative, include the requirement for avoidance and fill minimization. This EIS does not provide a detailed discussion or quantified costs about compliance with the current CWA or future SMCRA fill minimization performance standards. This type of analysis is not required because the purpose of this draft EIS does not include evaluation of the costs of meeting fill minimization. Those requirements were subject to public scrutiny during the administrative process at the time the CWA Section 404(b)(1) regulations were promulgated.

Costs of compliance are not a factor in enforcement of SMCRA or the CWA that can override environmental protection standards set by law. An applicant may find that costs of compliance with the SMCRA and CWA performance standards are prohibitive to profitable mining of some coal deposits. Decisions as to whether company can internalize costs for avoidance and minimization are part of the many factors considered in making a business decision as to mining viability that should occur prior to application. However it is the purpose of this EIS to generally inform the public and decision makers of the consequences of implementing measures for fill minimization on the economy.

Implementation of any quantified fill minimization evaluation methods under the action alternatives would increase the informational reporting requirements for permit applicants on sites that generate excess spoil. Overall review periods and amount of corrective correspondence between applicants and reviewing agencies would increase. This would have the effect of increasing mine permitting costs due to the greater level of effort required in application preparation.

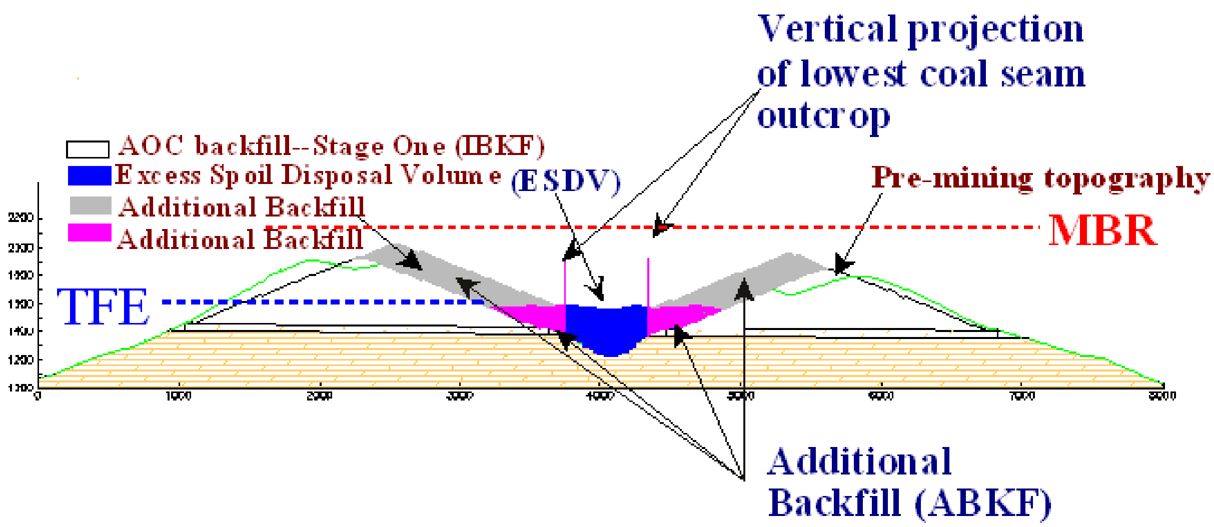
In some instances an operator may have to expand the permit area for upland disposal alternatives with consequent increased transportation costs and attendant costs for purchase or rights of access. Fill minimization may increase operational costs to the mining operator because spoil that must be returned to the mine site has higher handling costs than the current practice of end-dump valley fill construction. In many cases, backfilling on the mined-out area is performed by the same end-dumping techniques as excess spoil placement in durable rock fills. However, unlike durable rock fill construction, backfilling may increase haulage costs, which may be more expensive because of distance, or because loaded trucks must haul uphill (more maintenance costs to engines, brakes, suspension, greater fuel costs, haulage vehicles require replacement sooner, etc.) to back stack to higher elevations to minimize the amount of excess spoil. Backfilling in some areas may necessitate extra handling (grading and compaction costs) to assure stability. This can greatly increase material handling costs for the operator.

While not a direct comparison, and somewhat dated, the regulatory analysis by OSM for the permanent program regulations indicated that placing spoil in lifts versus end-dumping to build valley fills added 17 cents/ton to the cost of mining coal in central Appalachia [p. 98, Table 27, "Permanent Regulatory Program of the Surface Mining Control and Reclamation Act of 1977, Final Regulatory Analysis" OSM-RA-1 March 1979]. This cost would be a portion of other expenses to an operator that affect the cost per ton to mine.

The following case study exemplifies the impacts of minimizing fills by applying WVDEP's AOC+ policy. A proposed surface mine will create 65 million cubic yards (mcy) of mine spoil. Initial analysis indicates that 38 mcy of spoil will be returned to the mined out area and 27 mcy placed in adjacent valley as in excess spoil fills. After applying the iterative fill minimization analysis required by AOC+, more than 26 of the 27 mcy of excess spoil could be returned to the mining area, therefore minimizing the volume of spoil needed to be placed in excess spoil fills. [Figure IV.I-1]

By applying AOC+, 1690 feet less of valley fill length (than in the original mine plan) were avoided. Although the results of AOC+ are site specific, the overall effect of reducing the amount of excess spoil, the resultant size of the excess spoil fill, and direct impacts to streams may be greatly lessened when compared to the past fills before 1999 for mountaintop removal or large area mines. Similar minimization analyses would be developed and applied to contour mining. Illustrations of the results of AOC+ for the case study mine site are shown in Figures IV.I.-2 and 3.

Figure IV.I-1
AOC+ Results in Additional Spoil Returned to the Mined Area and Not in Streams



(Source: WVDEP AOC Guidance Document, 2000).

Figure IV.I-2
Illustration of General Results of AOC+ on Length of Stream Impact

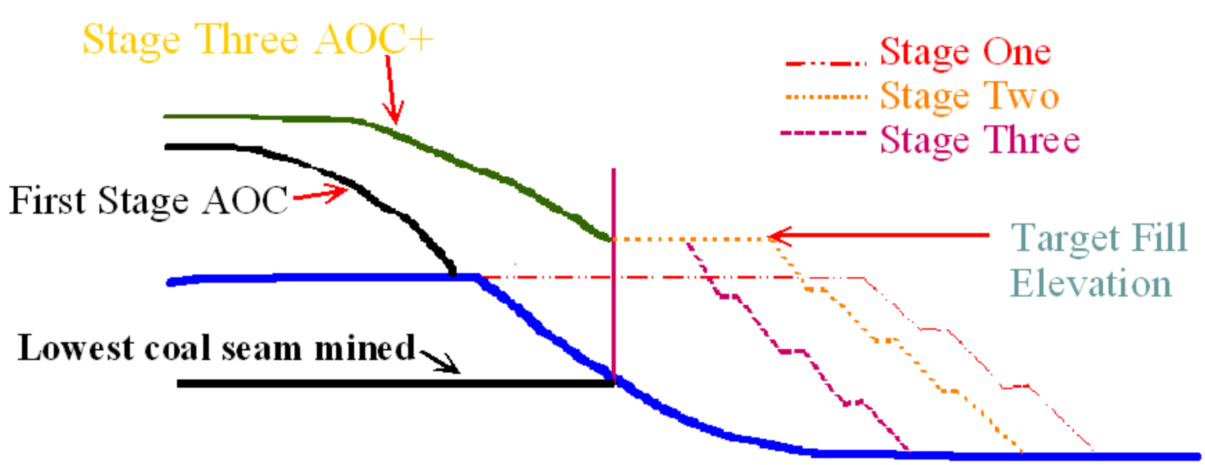
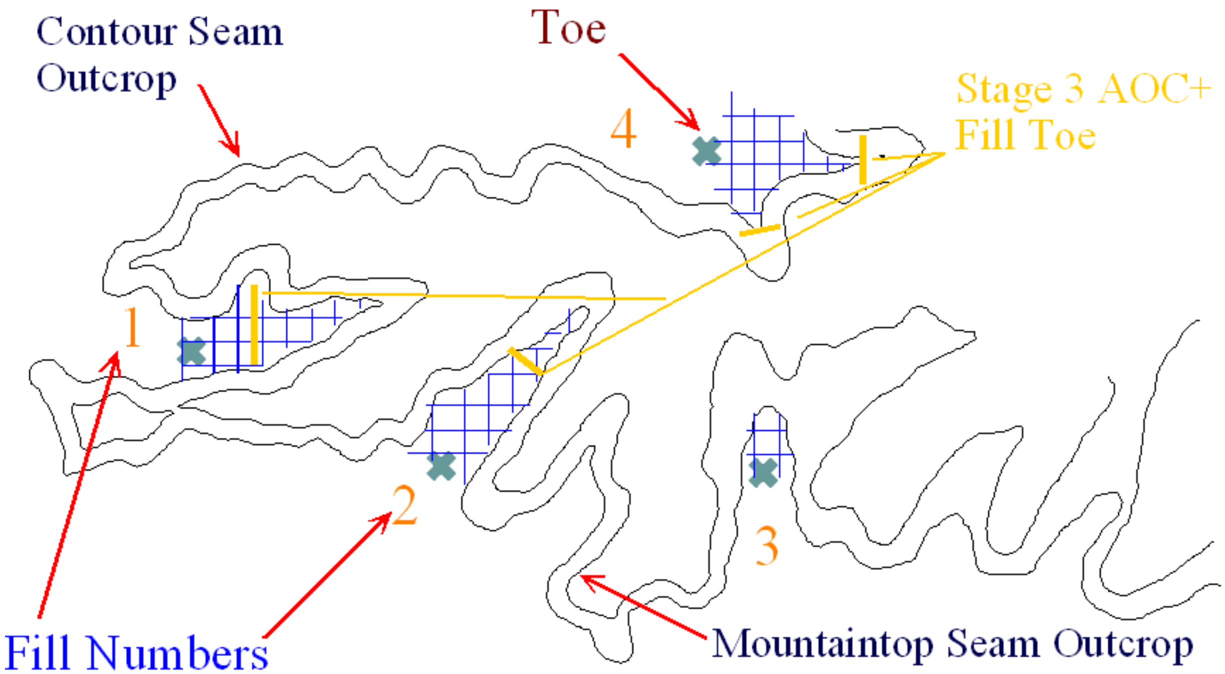


Figure IV.I-3
Illustration of Original Fill Toe Location (At Teal Colored "Xs"); and After AOC + Process (At Gold Lines)



Fill minimization costs for the operator under the example above would be dependent upon the additional logistics and haulage costs. The operator may have initially assumed that the 27 mcy could be hauled a short distance and end-dumped into a fill at relatively low costs. Upon applying AOC+, the operator must now haul 26 of the 27 mcy to the backfill area for grading and reclamation. If this additional hauling and handling adds \$0.50-1.00/cubic yard, the operator must absorb \$13-26 million additional operating costs from profit margins, if possible. While these increased costs will undoubtably reduce mitigation costs from affecting about 1700 feet of less stream reaches, some operations will likely become infeasible due to reduced return on investment. The only other alternative to mining the coal reserve and avoiding/minimizing valley fills may be to conduct contour mining and auger/highwall mining, consequently reducing reserve recovery considerably.

b. Data Collection and Analysis

The requirement to conduct stream functional assessments to determine size, number and location of valley fills, as well as the aquatic resource impacts and mitigation, will require additional biologists and ecologists in COE Districts under all alternatives, including the No Action Alternative. The data must be reviewed relative to extent of waters of the U.S., the completeness of the alternatives analysis, and the scoring of the biological, chemical, and physical conditions of the stream segments planned to be affected or analyzed as alternatives. These types of analyses are central to determining compliance the CWA Section 404(b)(1) Guidelines and setting adequate mitigation levels. The COE must evaluate the same type of data for adequacy of the proposed mitigation projects, to establish baseline stream characteristics, and review the stream improvements. The COE must also perform site visits to determine if the projects are in compliance with permit conditions.

c. Mitigation

Under all alternatives, including the No Action Alternative, reclamation and mitigation practices are required by the CWA Section 404 program to restore stream habitat and aquatic functions impacted by MTM/VF through on-site reclamation and on-site and off-site mitigation [Chapter II.C.6]. These practices may include stream construction or enhancement, the construction of other aquatic systems, such as wetlands, and the restoration or enhancement of riparian habitat to compensate for the loss of aquatic functions. Preservation of high quality streams through creation of conservation easements or land trusts and the payment of in lieu mitigation fees for stream protection and restoration measure would also be considered. The costs for in-kind mitigation and in-lieu fee agreements may be considerable but are not presented in detail here. Presenting costs for complying with the COE regulations is not required, inasmuch as the purpose of this NEPA analysis is not to present alternatives to mitigation requirements.

Both on-site and off-site mitigation are likely necessary to insure that only minimal individual and cumulative impacts occur under all of the alternatives considered, including the No Action Alternative. The utilization of a stream assessment protocol provides a more accurate characterization of the loss of aquatic functions and the ability to more accurately predict the opportunity to restore aquatic functions loss at the reclamation or mitigation site. The protocol will also play a substantial role in identifying high quality streams, which may be avoided to reduce the impacts and associated mitigation costs.

Actions associated with Alternatives 1, 2, and 3 would require that a data collection program be implemented as part of utilizing a stream assessment protocol and a water quality and mitigation monitoring program [Chapter II.C.]. A more complete evaluation of the aquatic resources would occur before impacts to headwater streams would be allowed. The data and protocol would also be useful in designing future mitigation projects. There are many aspects regarding impacts of headwater streams and possible mitigation efforts for functions lost that can be better addressed through additional data collection. These actions would provide a venue to achieve this goal. Costs associated with the data collection were previously discussed in Chapter IV.I.3.b and 4.b. While mitigation costs occur under all alternatives considered, the costs to an operator are increased over mitigation costs required by the COE and/or the states prior to 1999.

A case example of alternative analysis and mitigation considerations was provided in Chapter IV.B.1.e. In the example, the Louisville COE District assisted a coal company in evaluating intermittent and ephemeral stream reaches for construction of valley fills and sediment ponds (with sediment transport channels intervening). Through use of the functional stream assessment protocol, the applicant was able to completely avoid intermittent streams, reducing 4,694 feet of originally planned stream impacts from 3 valley fills to a re-designed mine plan with only one fill in 950 feet of an ephemeral stream segment. In addition to decreasing linear feet of stream impacted, this re-design also avoided higher quality streams. The applicant satisfied this mitigation, in part, with on-site, in-kind restoration of the sediment transport channel between the fill and pond. The plan change reduced the mitigation costs from an original assessment of $300,000 to a $128,000 in lieu fee arrangement under the new plan.

Using only the COE case study as an estimate of cost per stream length impacted, mitigating the 724 miles of stream impacts from the Fill Inventory would assess in lieu fees over $516 billion. To avoid these costs carries other costs of material handling. The case-specific decision to construct fills or haul spoil will be integral to a mining financial plan.

d. Deforestation

Through efforts by states, the OSM forestry initiative, and other technology transfer and regulatory incentive methods, landowners and the regulated community are becoming increasingly more apt to implement forestry post-mining land uses and on-the-ground results are meeting with some success. Recent research shows that forestry post-mining land use is less expensive than typical grassland reclamation. Mine sites in Virginia indicate regrading costs for reforestation were reduced by $200-500/acre (Burger and Zipper, 2002). Research by Dr. Donald Graves at the University of Kentucky shows that, when compared to typical grading costs for establishing a hay land/pasture land use, an estimated $1,650-2,640/acre in reduced grading costs occurs when the research recommendations for forestry are followed (personal communication, 2003).

In Virginia, the majority of recorded post-mining land uses proposed on coal mine sites are forestry (VADMLR, 2002). A recent study of the proposed post-mining land uses on current mountaintop mine sites in West Virginia revealed that 68% of the sites were to be reclaimed to forestry-related land uses [Appendix G; (Yuill, 2002)]. There is not complete certainty that these reforestation efforts will resolve all the problems inhibiting the successful establishment of forest communities on reclaimed mine sites. However, recent research indicates quality forest communities equaling or exceeding growth rates existing prior to mining can be successfully and economically established on these mined sites. Improvements in the ability to re-establish a forest community on reclaimed mines sites comprised of highly-marketable species equal or exceed growth rates prior to mining.

As the number of years to re-establish forest decreases, economic benefits for the permittee, the landowner, and society in general are realized. The need of our nation for products derived from the forests (such as housing, paper products, furniture, etc.) places certain demands on the forest resource. This demand would be met more effectively through improvements in reclamation proposed in the action alternatives [Chapter II.C.8, Action 15]. Landowners will benefit as high quality forest follows mining. This provides greater opportunity to derive economic gain from the property, should the landowner choose to implement forestry post-mining land uses.

Timely re-establishment of quality forest communities on undisturbed natural sites or reclaimed mine sites do not prevent terrestrial impacts of deforestation described in Chapter III.F. But, with implementation of the latest research recommendations, long-term environmental effects are minimized and economic benefits of greater forest yields could be realized. Without an OSM effort to develop a BMP manual for the state-of-the-science in terrestrial reclamation, as described in Action 13, the rate of embrace of effective techniques may be slowed.

5. Economic Consequences Common to Alternatives 1, 2, and 3

a. Government Efficiency and Coordinated Decision Making

The basic and common tenets of surface coal mining regulatory programs (e.g., CWA Sections 401, 402 and 404, SMCRA, ESA, FWCA, CAA, NEPA, and other related state and Federal programs) are environmental protection and enhancement. State and Federal agencies responsible for implementing these programs strive to manage their respective programs to effectively accomplish the environmental protection goals, while minimizing duplication with other programs and avoiding the wasteful expenditure of human resources and public funds.

Three alternative approaches are proposed in this EIS to enhance the coordination among the state and Federal agencies in order to make each program more efficient and effective in minimizing the adverse environmental effects from mountaintop mining and valley fill construction. Only limited coordination among the various state and Federal agencies would occur with selection of the No Action Alternative. That is, a consecutive, rather than concurrent, MTM/VF application review process would likely continue without implementing actions described in Alternatives 1, 2 and 3.

Alternative 1 suggests that the COE make an initial determination of the size, number, and location of valley fills. Alternative 2 proposes a coordinated decision process among the COE and SMCRA regulatory authority to determine the size, number, and location of valley fills. Alternative 3 envisions the SMCRA regulatory authority initially determining the size, number, and location of valley fills. Increased coordination and determinations relative to siting valley fills carry administrative costs for the regulatory agencies as well as data collection, analysis, and application development costs for the mining industry.

Pertinent information regarding the SMCRA agencies and COE District Offices within the EIS study area follow. These data are relevant to regulatory and administrative costs under all alternatives.

Table IV.I-1
Comparison of SMCRA Agency and COE District Permitting Programs

State	Staff[1,2]	Payroll (millions)	New Surface Permits[3] (2001)	Other 2001 Permitting Actions[4]	Permit Acreage New/Other[4] (1,000s)
KY DSMRE	88	$3.0	58	234	13.2/31.1
TN OSM	11	$.9	3	38	1.1/0.6[6]
VA DMLR	22	$1.0	23	597	7.7/3.9
WV DEP	86	$2.4	30	314	10.2/0.8
SMCRA TOTALS	**207**	**$7.3**	**117**	**1145**	**35.8/33.1**
COE Huntington	9.6[5]	$0.57[5]	80 to 100		N/A
COE Louisville	3.0	$0.21	~35		N/A
COE Norfolk	1.3	$0.10	6 to 12		N/A
COE Nashville	0.9	$0.07	<5		N/A
COE TOTALS	**14.8**	**$0.95**	**126 to 152**		**N/A**

[1] SMCRA Agency staff working on permits of any type (surface, underground, preparation plant, etc.)
[2] COE District staff represent those staff working on NWP 21 authorizations and Individual Permits
[3] New permits issued for surface mining; does include all applications received.
[4] "Other" represents surface mining permitting actions involving renewals, modifications (revisions and incidental boundary revision); does not include underground mines and preparation plants.
[5] Does not reflect plans to hire two additional staff for coal mining-related work (~$115K/year)
[6] Includes acres from incidental permit revisions but not revisions

The staff organizational structure and budget represents those currently administering the permitting process under the No Action Alternative. To effectively administer the new procedures and reviews required by the revised NWP 21 for coal mining activities (i.e., case-by-case reviews of avoidance, minimization, and mitigation proposals for all unavoidable impacts to waters of the U.S.), additional COE staff would likely be required. For instance, the COE Huntington District anticipates hiring two additional people to process coal mining-related CWA Section 404 permits. The current workload is approximately 200 new permits per year with more than 1,000 other coal mining revisions typical in the EIS study region. To conduct the necessary fill minimization and flooding reviews reflected in proposed actions in this EIS, the estimated cost for additional engineers is $2+ million.

These staffing issues are closely related to actions described in other sections of this chapter, however they are generalized here because the level of staffing is critical to successful coordinated decision making and government efficiency. If any regulatory agency involved does not have adequate resources to provide thorough environmental compliance reviews of MTM/VF proposals, the impact on other agency reviews and approvals affects the entire permitting process and project implementation. The design of a project with sufficient agency input, when properly inspected and enforced, has direct relevance to the quality of environmental protection and enhancement results on the ground.

As outlined below, Alternative 1 will result in the highest administrative cost to the state and Federal governments; Alternative 3, the lowest administrative cost; and Alternative 2, intermediate costs with a mix of Federal and state engineers performing reviews. Alternative 2 is more practical and realistic, since there are likely to be mining project applications that must be reviewed as IPs, and the COE would require engineers to complete both IPs and NWP processing.

b. Consistent Definitions

Action 2 is proposed for implementation under Alternatives 1, 2, and 3 [Chapter II.C.2]. Terms and stream characteristics with particular significance in the regulatory programs would be consistently applied through guidance, policy, or codified under common definitions through rule-making for CWA and SMCRA. Acceptable field methods and protocols for identifying streams and stream characteristics would be developed for the CWA and SMCRA programs. The Federal and state regulatory authorities propose to jointly prepare technical guidance to facilitate implementation of the use of these defined terms and delineation protocols by both the regulatory agency and the regulated community.

Implementation of Action 2 should result in impacts that are essentially the opposite of those outlined in the No Action Alternative. Less conflict and confusion over defined stream characteristics would result in better and more consistent environmental protections, lower costs to the industry and the ability to make business decisions prior to project application, and less likelihood of litigation-related costs to the local citizens, the regulatory programs, and the regulated community.

c. Data Collection and Analysis

The 2001 COE NWP EIS may understate anticipated applicant costs for NWP 21 submissions based on a more current and thorough consideration of the scope and effect of these requirements on MTM/VF proposals. While no detailed cost estimates are required or available for this EIS, the COE estimates are likely to be low by at least an order of magnitude. For example, some coal industry members asserted that the EPA biological/chemical monitoring stream protocol implemented in 2000 and 2001 in Appalachian steep-slope coal producing states would increase permitting costs by several hundred thousand dollars for larger permit applications due to the cost of additional benthic sampling and identification, testing for additional chemical species, and synthesis and analysis of data. This EPA stream protocol contains some of the components of the COE functional stream assessment protocol, however other data collection and analysis are required. Therefore, if performed by the applicant, the COE protocol may be more expensive than the 2000 EPA stream protocol.

The state or Federal permitting agencies would require additional staff with engineering expertise to conduct reviews of the upland alternatives/fill minimization analysis. This is particularly true of the COE in the No Action Alternative or Alternative 1, when COE reviews govern those permits processed as IPs. The COE does not currently have staff with mining engineering background in the District regulatory branches. The CWA Section 404 minimization and alternative analyses involve a knowledge of mine planning theory and practice, as well as operational feasibility to determine if all practicable alternatives have been considered. While SMCRA agencies have these types of qualified staff on hand, the added analyses and review may exceed existing permitting staff capacity due to the large workload from permitting actions currently processed.

Discussions with a WVDEP engineer and permitting manager provided an estimate that fill minimization, through application of AOC+, adds 20% to the total time necessary for an engineer to properly analyze permits for fill minimization [personal communication, 2002]. WVDEP has around 14 engineers on staff. Assuming that all engineers might have to perform AOC+ reviews, three additional engineers (~$100-150K) would be required. This estimate may be liberal, because all engineers may not be involved in AOC+ reviews (i.e., they may specialize and, therefore, some segment of the WVDEP engineers review stability, ponds, hydrology/hydraulics, roads, etc.) and, with time, reviews could become more routine. Both applicants and state reviewers would become more familiar with the process, applications would improve, and review time eventually reduce. However, this estimate may also be too conservative, in that every permit with fills--whether contour mining or mountaintop removal-- will require some sort of more detailed fill minimization review and increase the overall average increased review time above 20%. Applying a 20% additional review time estimate to other states in the study area: Virginia DMLR will require at least one full-time staff and $45-60K in additional funding; OSM's Knoxville Field Office, one half-time staff and $38K additional funding; Kentucky DSMRE 3.5 full time staff and $120-200K in additional funding. Thus, an additional $3-400K in combined state revenues, federal grants, and federal salaries is the minimum estimated need for implementing this more detailed analysis of fill minimization under Alternatives 2 and 3.

COE increased staffing costs would be commensurate with the number of engineers that would be required to process the approximately 200 new surface mining applications and another 1000 permit revisions (e.g., modifications, incidental boundary revisions), renewals, transfers, mid-term reviews and other permit processing activities--many involving valley fills. The Federal government typically pays an experienced engineer, on average, ~50% more than state salaries/benefits. Under Alternative 1, the COE would need as many or more engineers as the state to review, comment, address revisions, and approve around 2-300 mountaintop mining proposals per year. Estimating 25-35 additional federal engineers to do COE AOC, flooding and other reviews translates into around $1.8-2.5M (20 experienced GS-12 engineers at ~$75K = ~$1500K; 15 GS-11 at ~$63K = ~$945K). Under Alternative 2, the COE would need fewer engineers to: 1) do more limited reviews of the state SMCRA authorities alternative/fill minimization analyses in the SMCRA permit, for NWP 21 permitting actions; and, 2) to perform more rigorous evaluations for those applications requiring IP processing. Under Alternative 3, the COE would also need some level of engineers for the approval of state reviews needed to issue NWP 21 authorizations.

c.1. Economic Consequences of Data Collection and Analysis Unique to Alternative 1

Alternative 1 anticipates that the COE would take the lead role in determining the size, number and location of valley fills placed in waters of the U.S. and set the level of compensatory mitigation. All surface coal mines proposing to place fills in waters of the U.S. would initially be processed as IPs. This would be a significant change from the current COE permit process. The COE would determine whether a project EIS or a EA/ FONSI would be required. Processing permits in this manner would result in a much more rigorous review by the COE.

Alternative 1 involves the COE performing the necessary avoidance, fill minimization, and mitigation assessment of MTM/VF proposals. The COE and EPA affirmed that use of the WVDEP AOC+ policy satisfies the requisite alternative analysis required by the CWA 404 (b)(1) Guidelines. For consistent application across the various COE Districts with jurisdiction over CWA Section 404 coal mining activities in Appalachia, the COE would either evaluate the adequacy of existing state SMCRA authorities AOC policies or, develop other procedures for applicants in Virginia, Kentucky and Tennessee to demonstrate that projects have satisfied the CWA Section 404 (b)(1) Guidelines.

It is certain that the regulatory costs of Alternative 1 would increase for the COE, in that the IP review and preparation of the NEPA compliance documents will require more staff. The COE estimated in its Draft NWP Programmatic EIS that processing permits under the NWPs cost an average of $389 compared to $1492 for processing IPs [2001 COE DEIS, Table D.4.2-1]. Based on the level of scrutiny required to satisfy the CWA 404(b)(1) Guidelines, evidenced through the EIS development process and interim permitting coordination in West Virginia, the COE estimates appear low. However, assuming that the number of permits processed will remain constant with the No Action Alternative (200 permits per year in the EIS study area), and the costs remain consistent with the COE 2001 estimate cited, the COE will experience an increase in administrative cost ranging from $400,000 for IPs, to over $2,000,000 per year for IPs and other revisions under this alternative.

Because of the additional staff resources needed to perform chemistry, biology, ecology, mining, and civil engineering reviews of impact predictions, alternatives, fill minimization, flooding, and mitigation analysis, these estimates may be understated by factors ranging from 10 to 20 times COE 2001NWP EIS figures. The NEPA compliance and public interest reviews result in greater COE processing costs due to the larger documents, more expansive detailed information, and additional opportunities for public participation and wider review and comment potential from local, state, and Federal agencies and organizations. An IP also provides for more EPA and FWS oversight and elevation of issues through the CWA 404(q) process that is not afforded in the NWP 21 process.

Conversely, state SMCRA agency costs for permit processing could decrease based on the reviews performed by the COE. The level of review by the states on the effects to the aquatic ecosystem should be reduced if they rely on the COE assessments. A number of other hydrologic assessments required by SMCRA could assist the COE in NEPA compliance. For instance, the state SMCRA and water quality reviewers would focus more on drainage and sediment control structure design, potential effects on water supplies, maintaining the hydrologic balance, PHC/CHIAs. The SMCRA review of terrestrial, post-mining land use, blasting, roads, embankment and impoundment stability would complement the COE NEPA compliance. The MOA and FOP envisioned under this alternative would detail the sequence and the inter-relation of permit review components by each agency.

An applicant for a CWA Section 404 permit would provide more information to process IPs, increasing costs to the applicant. The data and analysis costs are similar to the description above in the No Action Alternative. To help reduce processing time, the applicant may choose to prepare draft EAs and/or EISs for an IP which would add greater costs. These documents must address not only the site-specific impacts of the mining proposal, but cumulative impacts of the project as well. EISs undergo multiple iterations of widespread distribution and review, comment, and possibly litigation. These steps could add considerable time to application processing and can affect the cash flow and investment positions of a mining company due to unpredictable time frames for mining operation commencement due to issue resolution, project re-design, litigation, etc.

Despite the increased costs to an applicant, there should also be some offsetting efficiency for the applicant due to better coordination between regulatory agencies. Multiple revisions by the applicant should not be required, as agencies would coordinate review comments and deficiency letters so the applicant could address all issues at the same time. Joint discussions between agencies, and between the agencies and the applicant, should better define compliance targets for the applicant with improved applications for both public and regulatory reviewers.

c.2. Economic Consequences of Data Collection and Analysis Unique to Alternative 2

Alternative 2 anticipates OSM (in TN) or the appropriate state SMCRA agency maximizing coordination and joint processing the SMCRA and CWA Section 404 permits. Unlike Alternative 1, in which the applicant applies separately to SMCRA and CWA agencies, a joint application would be developed containing the permitting requirements for both agencies. Like Alternative 1, more rigorous information and analysis would be required of the applicant; surface mines will be designed in consideration of both programs; and the SMCRA agency and COE would review the information to minimize duplication and maximize the use of each entity's respective expertise and regulatory focus. Also, like Alternative 1, the agencies would enter into an MOA to outline the coordination process and develop FOPs to expand on specific parts of the coordination roles and responsibilities for certain portions of the mining proposals. This coordination would greatly aid the applicant in understanding requirements, clearly address compliance criteria, and provide more comprehensive and comprehensible applications to meet CWA and SMCRA standards as well as better inform public and other interested stakeholders. The consequences of this integrated review alternative would include increased environmental protection, reduced processing times and costs to the permit applicant, and reduced administrative costs.

The COE would make case-by-case decisions on the type of permit process and level of NEPA analysis for MTM/VF projects. Therefore, the consequences of Alternative 2 are dependent on the number of permits requiring IP versus NWP processing. To the extent that a certain percent of permits must undergo IP review, the economic consequences would be similar to those described for Alternative 1. Similarly, those permits authorized under NWP would have consequences similar to those described below in Alternative 3.

Another important element of the coordinated decision making process in Alternative 2 is the revision of SMCRA regulatory program provisions [Actions 3 and 7]. The revision would provide for data collection and minimization/alternative analysis more consistent with the requirements of the CWA Section 404(b)(1) Guidelines.

Increased cost for COE reviews would be less than those costs described in Alternative 1, because all applications would not be initially reviewed as IPs. The SMCRA agencies would take on a greater role in fill minimization and alternative analysis, as well as considering on-site mitigation in SMCRA permit decisions. The COE review for approving NWPs should require less rigorous evaluation, in order to determine that all CWA considerations were made in the state review. COE reliance on SMCRA reviews should decrease processing costs considerably. SMCRA agencies, on the other hand, would likely require additional biologists, hydrologists, ecologists, and engineers to conduct the necessary analyses. The relative increased staffing costs to the states would be proportionately less than the increases for the COE. States have a full compliment of disciplines in their larger permit review organizations than the COE does and economies of scale should apply. State program costs are generally less than Federal program costs. Table IV.A-1 shows that state program staff levels are more than sixteen time COE permitting staff for coal mining, while the state costs are only eight times the COE payroll and benefits. Thus, from a staffing increase perspective, Alternative 2 presents potential cost savings over Alternative 1.

c.3. Economic Consequences of Data Collection and Analysis Unique to Alternative 3

Alternative 3 anticipates that the SMCRA regulatory authority would promulgate provisions for fill minimization and alternative analysis more consistent with CWA Section 404 requirements and take the lead processing and conducting the initial reviews. The COE and the SMCRA agency would work together to develop a joint application containing SMCRA and CWA Section 404 permitting requirements.

Increased SMCRA staff would be required to conduct the initial reviews due to additional biological/ecological stream chemistry aquatic data, and more mine planning, hydrology, and hydraulic engineering evaluations. The consequences of this action are similar to the No Action Alternative in some ways because the COE would begin processing most permits as NWP 21. The administrative cost of this alternative will be similar to the No Action Alternative, but lower than either Alternatives 1 or 2. COE staffing increases are likely, but less than Alternative 2 and markedly less than Alternative 1. State staffing increases would be similar to Alternative 2 but slightly higher because additional minimization and alternatives analysis review, done by the COE in Alternative 2, would be borne by the state in Alternative 3. Administrative costs to the Federal agencies have the potential to be lowest in Alternative 3 if states ultimately can use the SPGP authority and the majority of permits qualify for the SPGP due to adequately minimized unavoidable aquatic impacts. There are no financial incentives for the states to gain CWA Section 404 authority, and the state costs for this authority have not been factored into this analysis. However, costs associated with SMCRA related to avoidance, minimization, and alternative analysis may be covered by 50% OSM regulatory grants.

The information and analysis submitted by the permit applicant will increase permitting costs, but less than Alternative 1 or 2 if most permits are eligible for NWP 21. The absence of NEPA compliance and a streamlined COE review should reduce applicant costs, although it is unlikely that every permit could qualify for NWP 21.

d. Mitigation

If Action 10 is implemented under Alternatives 1, 2, and 3 as proposed, the agencies would, as a part of the MOU developed under each of the action alternatives (and if necessary with revision of existing SMCRA or CWA regulation, policy, or procedures), clearly define and commit to writing the roles and responsibilities for permitting, monitoring/inspection, and bonding of mitigation projects. This would provide the agencies with the opportunity to coordinate these activities in order to increase certainty that all mitigation requirements are being implemented and minimize identified inefficiencies associated with duplicate systems. By incorporating all mitigation construction plans/specifications, time lines, and success criteria into each issued permit, inspectors would have all the information needed to ensure the mitigation projects are properly completed. This would also serve to minimize costs to both the taxpayer and the applicant.

e. Flooding

Alternatives 1, 2, and 3 share a common action specifically designed to more effectively evaluate flooding risk during SMCRA or CWA permitting. The action proposes joint development of guidelines for appropriate flood risk evaluations by the COE, OSM, and state SMCRA authorities. The guidelines would discuss suitability of different modeling algorithms for various situations, the proper rainfall frequency/duration and other mining site condition (runoff curve numbers and other values, like time of concentration, travel times, roughness coefficients, etc.) assumptions for assessing flood potential.

The effect of a modeling requirement on the permitting process would be variable depending on the degree of complexity of the modeling, but would generally increase costs to the applicant and permit review agencies. The effects on individual permit applications would depend on the size of the application, complexity of the mining plan, and number of modeling points required for the assessment. Large, complicated permits would require more effort than small, simple mine plans. Except in cases where multiple valleys below a mine would drain to a single pond, the number of modeling runs required for each permit would depend on the number of stream valleys downstream of the proposed mine.

Requirements for site-specific runoff modeling would increase the costs of permitting to mining companies for each permit application; and to regulatory agencies for individual project reviews and for cumulative impact analysis of multiple operations in a cumulative impact area. Coal operators would see increased costs from permitting consultant fees or internal engineering staff reflecting the greater engineering effort required to prepare a permit application. Regulatory agencies would likely need additional skilled staff, either as preparers of the CHIA models, or for model reviews when submitted by permit applicants. The dollar value of such changes cannot be predicted without established modeling guidelines.

The quantitative analysis of the potential for flooding caused by a MTM/VF operation will affect the cost of permit preparation, review, mining and reclamation, and inspection. This effect would be variable depending on the degree of complexity of the mining and reclamation plans. Large, complicated permits would require more effort and cost than small, simple mines. The cost of permit modeling may not be as substantial as implementing the on-the-ground controls to assure mining does not increase flooding risk above what existed pre-mining. For the coal company preparing the permit, this analysis may include the consideration of various mining plans and surface water runoff control scenarios. These scenarios could consider water detention structures, drainage patterns, maximum disturbed areas, soil and overburden handling, reclamation configuration, and ground cover. Each scenario will have its associated costs for construction and implementation during mining and reclamation. Recent application reviews by WVDEP using the SWROA have resulted in considerable application revisions that limit the amount of disturbance open at one time in particular watersheds, hydraulic control changes to channels, and different runoff routing through a watershed–with attendant costs for construction.

The review by regulatory authorities of quantitative analyses of flooding potential for an application would require additional effort, including additional staff who have had adequate training to evaluate the surface water control plan for each permit. The regulatory authority may also require additional staff and training to inspect the surface water control structures at each permitted operation during mining and reclamation to assure plans are effectively carried out and certified by engineers.

While there are additional costs for application preparation, review, implementation, and inspection, the potential for the mine site to contribute to offsite impacts due to flooding would be decreased by this action. This consequence of better protecting the public and the environment meets the intent of the existing regulatory requirements. Additionally, quantitative analysis may result in denial of permits that are allowed under the No Action Alternative. Denial of or a decision not to proceed with a project proposal could depend on the selected flooding risk threshold, increasing overall costs to the mining industry from unfulfilled plans and potentially placing some reserves off-limits to mining.

Regardless of the actual flood risks, there can be real or perceived consequences when persons down stream of an actual or potential surface mine site believe that surface mining increases their risks from flooding. The perceived flood risk can affect land uses and property values by reducing the willingness to live on and make improvements to properties in such areas. This perceived risk problem can be exacerbated when the residents lack confidence in the veracity and forthrightness of mining operators. Recent actions by mining companies following flood events have ranged from generous temporary housing and re-establishment of residents in new or repaired homes to denial of any liability for flooding results. Both reactions may be warranted based on the findings of runoff studies for this EIS. That is, flooding consequences are very site-specific to conditions above and in any stream valley.

f. Deforestation

Alternatives 1, 2, and 3 share an action for development of BMPs for selecting appropriate growth media, reclamation techniques, revegetation species, and success measurement techniques for accomplishing post-mining land uses involving trees [Chapter II.C.8.; Action 13].

The implementation of this BMP could have economic impacts for the landowner and the regulated community. For instance, some of the BMPs may encourage maximizing forest product recovery. Forest product uses may increase revenues to the landowner, if the market, including transportation costs, provides a viable price for the product. Implementing organic utilization practices in the BMP manual could add cost to the mining operation, when compared to the existing practices for disposal of organic materials remaining following logging. These costs would vary, with windrowing and organic “islands” likely being less costly than mulching.

The implementation of BMPs related to revegetation success standards could have economic impacts for the regulatory agency and possibly for the regulated community as well. Regulatory agency costs would be incurred in applying any BMP guidance in the field (employee training, additional field measurements or tests to determine success, etc.) If any new BMP guidance resulted in a mine site not meeting revegetation success standards, the extended bond liability period and any supplemental revegetation activities needed to meet the revegetation standard could increase costs. However, if research recommendations for establishing a suitable growth medium for trees are followed, the decreased costs of reclamation may offset any increase cost to the regulated community.

Another proposal common to the action alternatives is the requirement, if established by Congress, to require reclamation with trees [Action 14]. The Congressional authority envisioned under this action would require reclamation with trees where trees were the pre-mining condition, unless environmental improvement could be demonstrated by alternative post-mining land uses. From a cumulative impact standpoint, this alternative would result in more widespread use of trees and may be more effective at assuring the values associated with a forest community are re-established following mining. However, this action could also result in increased or decreased costs to the regulated community as operators (who would not otherwise have planted trees) may now be required to use reforestation reclamation and successfully plant trees with a healthy/successful yield. Improving property value by establishing a land use other than forest may not be an option for the landowner under this alternative. The applicant may be unable to demonstrate higher environmental value for non-forestry land uses to receive a variance from such a statutory mandate for reforestation of the property. Administratively, such Congressional action, if implemented, could result in an increase in takings claims. The mere filing of, much less success in, takings claims could have substantial impact to state and federal governments. Litigation, settlement, and judgement costs regarding property rights, could present liability to agencies.

g. Air Quality

The action alternatives propose a common action that would result in BMPs for controlling fugitive dust and blasting fumes or additional regulatory requirements, as appropriate, to minimize these types of adverse air quality effects [Chapter II.C.9; Action 15]. Use of BMPs does not necessarily carry additional costs, depending on the site-specific circumstances. However, requirements to provide dust suppression technology or minimize blasting fumes would likely add considerable costs to monitor and implement additional controls.

J. RECREATION

Tourists are drawn to the visual, cultural, and natural amenities found throughout the study area. Resident and non-resident tourists travel to various outdoor recreational sites throughout the study area for camping, hiking, fishing, swimming, canoeing, hunting, boating, and sight seeing, biking, skiing, off-highway vehicle use, golf, running and festivals. According to Canaan Valley Institute, the Mid-Atlantic Highlands Region offers diverse, economically significant opportunities for recreation and tourism, including hiking, birding, camping, swimming, canoeing, white water rafting, skiing, and other outdoor recreational activities, generating $26 million/year in direct revenue. In addition, hunting and fishing license sales bring in more than $88 million/year to state economies in the Appalachian region. (CVI, 2002) The EIS study area is a part of the Mid-Atlantic Highlands Region. A discussion of Outdoor Recreation and Tourism can be found in Chapter III.T.

Tourism and travel businesses include private and public lands and facilities, such as, campgrounds, hotels, motels, restaurants, gift shops, service stations, amusements, other recreation facilities, and undeveloped real estate. Within the study area in West Virginia alone, there are approximately 15 state parks and forests, in addition to 10 designated wildlife management areas. The Mid-Atlantic Highlands already contains many public lands that are attractive to visitors, but 75% of the forested lands remain in the private sector (CVI, 2002).

Public land needs and demands are very heavily tied to recreation development in the region. There are certainly localized demands for public lands for uses such as schools, community parks, and other public facility developments (West Virginia State Comprehensive Outdoor Recreation Plan, 1997). However, the acreage requirements for most of this development are minimal, and will be linked to existing community locations in most cases. A compilation of the major demands for public lands in the region identified by various federal and state agencies shows significant differences between counties in the region in the need/demand for hunting and fishing, water recreation, and special needs recreation areas–facilities that generally require significant areas. Counties that have a high demand/need for one or more of these activity areas are Kanawha, Lincoln, Logan, Raleigh and Wayne Counties [WVDNR Capital Improvements Plan 1998; WVU Land Use Assessment 2001].

In addition to public lands being available in the study area for recreational activities, private lands are used for recreation by members of the public. It is assumed that, although some of these private lands were affected by MTM/VF operations, the region contains similar lands which are available for recreational experiences outside the locale of a particular MTM/VF operation. Further it is recognized that recreation opportunities related and unrelated to mining are changing in the study area and region. Another limitation to public recreational use of private lands is the fact that landowners who previously tolerated unrestricted access to their land have reacted to increased use and liability concerns by restricting access to private lands.

1. Consequences Common to the No Action and Action Alternatives

Tourists, residents and landowners enjoy the natural environment for outdoor recreational activities including camping, hiking, fishing, swimming, canoeing, hunting, boating, and sight seeing, biking, off-highway vehicle use, golf and festivals. Dramatic topography and generally good air quality combine to create spectacular vistas. Many of the vistas can be seen from highways back country byways and public lands. Other vistas because of their remote locations can only be seen from the air, private lands or a nearby mountain crest. Tourists are also drawn to the study area for outdoor oriented recreation at the available sites. Available recreational facilities in and around the study area include state parks, national forests, state and federal fish and wildlife management areas as well as privately owned lands open to the public. Most of the lands in the study area are privately-owned and managed.

Public parks, forests, management areas and privately owned lands open to the public, in and around the study area have a growing number and diversity of visitors seeking recreation and access to the visual, cultural and natural amenities of the region. Projections show that the number of visitors to outdoor recreational facilities in the study area and surrounding vicinity will continue to grow, particularly for camping sight seeing, hiking, biking, and off-road vehicle use.

The effects of mining on recreation tend to be localized and depend on a variety of factors. These factors include the size and type of the mine, the mine setting, the recreation activities occurring in the area, the experiences derived from these activities and opportunities for similar activities in other nearby areas. Examples of the types of effects that coal mining development and operations could have on recreation include the following:

- Loss of recreational resources that might lead to displacement of the activity to alternative areas or loss of ability to engage in the activity;
- Modification of recreation settings leading to changes in recreation experiences and types of recreation facilities available due to project related activities or the presence of project related facilities;
- Reduced feelings of solitude and remoteness due to the introduction of visual, sound or other sensory effects from project related activities or the presence of project related facilities that could conflict with recreation use; and
- Changed access to the area, which could open the area to some uses but close it to others. For example mine developments may reduce opportunities for non-motorized outdoor activities while increasing opportunities for motorized recreation.

Residents and visitors to the study area use the natural environment for a range of activities including the harvesting of non-traditional forest products and subsistence gardening. Non-traditional forest products include sassafras, ginseng, goldenseal, mayapple, slippery elm and other botanical products which can be harvested in the Southern Appalachia region. In the Appalachia region specifically, the harvesting of non-traditional forest products contributes to the local economy. Some wild gathering or subsistence gardening locations may be affected by MTM/VF operations. Surface mining operations, by nature, do not allow for concurrent alternate land uses. Another contribution to the decline in lands in the study area being used for wild gathering or gardening is the fact that private landowners have increasingly begun to close off these lands to the public for safety and security reasons. The inherent decline in the ability to engage in gardening or wild gathering by the general public is likely to continue under all the alternatives. However, through improved co-ordination and analysis envisioned under all the alternatives, this decrease in opportunities could lead to alternative areas being created or set aside to be enjoyed as “commons.”

Habitat changes will occur in the study area. Some of the changes will involve a shift from a forest-dominated landscape to a fragmented landscape with, in some instances, considerably more grassland habitat. MTM/VF operations contribute to fragmentation of a forested landscape. The shift from a forest dominated landscape to grasslands and forest edges can lead to a shift in the plant and animal populations from forest to grassland or forest-edge species. The indirect effect of a shift in the plant community is an increase in game species such as whitetail deer and turkey due to an increase in grasslands and the diversification of habitats. The continued habitat changes in the study area are likely to occur with or without MTM/VF operations. A proposed action common to all the alternatives is designed to facilitate reforestation efforts. The direct impacts of MTM/VF operations, in this regard, to recreation dependent upon a forest dominated landscape may be temporary, if the post-mining land use is to restore the pre-mining forest habitat or permanent, if the site is developed for a post mining land use other than forest. The consequences to recreation of such land use shifts under all alternatives are changes in the type of outdoor recreation experiences available. For example, bird-watching for forest interior species will likely be replaced by bird-watching for grassland or edge species while hunting (wild turkey) opportunities could increase. Consequently, the forest recreation activities affected by fragmentation whether due to MTM/VF or other causes would change the recreation experiences available.

Areas that offer more primitive recreation opportunities could decrease because of the vulnerability to mining dominating the local setting by the elimination of the wild land character due to noise, traffic, dust or other mining related condition. Also, development pressures from activities other than MTM/VF operations to primitive settings could decrease the availability of primitive recreational opportunities in the study area. The direct impacts of MTM/VF operations, in this regard, to recreation dependent upon a remote and wild landscape may be temporary, if the post-mining land use is to restore the pre-mining habitat, or permanent, if the site is developed for a post mining land use other than what existed pre-mining. Consequences to recreation of such mining conditions are changes in the type of outdoor recreation experiences available in the local setting of the mine site or those seeking primitive recreation opportunities to look elsewhere in the study area for such recreational opportunities. To the extent MTM/VF would affect the primitive character of recreation in the study area the magnitude of such effects would be the same under all the alternatives.

Lands in the study area provide diverse recreational experiences. All mining permits, including MTM/VF operations include a designated post-mining land use. In some instances, a mine site will be reclaimed to a public recreational use, or after reclamation, be converted by the landowner to a recreational use. An example of where mine sites may be reclaimed to a designated post-mining land use as recreational facility is the development and maintenance of the mine site as a public golf course. An example of a change in recreational use after reclamation is when trails are developed on a former mine site for hiking, biking, camping or other use open to the public. The diversification of recreational opportunities in the study area is likely to be the same under all alternatives.

Added access to local settings in the study area could increase the accessibility of existing recreational opportunities or provide a way to previously isolated land that could be developed for recreation. The building and/or improvement of roads to and on MTM/VF operations have the effect of making previously inaccessible areas attractive for use or development. For example improved public roads and/or new mining roads increase the accessibility to new local settings for off-highway vehicle use (some times with landowner permission and sometimes without). The increase in access to local settings within the study area is likely to continue an the consequences be similar under all alternatives.

The effects of MTM/VF operations on recreation would vary a great deal based upon the resource setting, the current recreation use of the area, the size and type of mine and opportunities for using alternative areas. Overall, under the alternatives it is anticipated that recreational opportunities in the study area will continue to change and diversify. In addition increased co-ordination in management of lands to be mined in the study area could improve overall recreation experiences at developed, undeveloped and new recreational sites.

A constant in recreational opportunities in and around the study area which will be unchanged under all alternatives is the existence of substantial public parks, forests, wildlife management areas or National Wild and Scenic Rivers. A discussion about these public lands is contained in Chapter III.T. Since these public lands in the study area and similar public lands around the study area are generally off limits to surface mining operations, they will remain available for a broad array of recreational opportunities from primitive to developed facilities (e.g. swimming pools). Mitigation envisioned in all the alternatives could be employed to conserve, preserve or otherwise add lands available for public recreational uses.

Areas adjacent to the study area provide opportunities for additional recreational experiences. These alternative locations have similar visual and natural resources as found in the study area and provide alternate sites for outdoor recreation in the event mining diminishes or displaces sites in the study area currently in use for recreational experiences. The consequences of the No Action and action alternatives are similar and cannot be distinguished from each other.

K. ENVIRONMENTAL JUSTICE

Under the auspices of Presidential Executive Order 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994)," federal agencies are required to evaluate the impacts of any federal action (e.g., COE 404 permit or OSM permit in Tennessee) to determine if the proposed action will disproportionately affect a minority, low-income, or culturally distinct community or population. This Executive Order, commonly referred to as the environmental justice (EJ) order, is intended to see that no person or group of people should shoulder a disproportionate share of the negative environmental impacts resulting from the execution of this country's domestic and foreign policy programs, and to ensure that those impacted have a meaningful role in the decision-making process. Preparation of this EIS document is also considered to be a federal action subject to the requirements of an environmental justice review.

In implementing the EJ review in this document, each individual action was considered as to the potential impacts of the action and alternatives, including the No Action Alternative, on identified EJ populations. It should be emphasized however, that this executive order applies only to Federal actions. Permitting of an individual proposed mine application by a state agency, when a SMCRA program is delegated to a state, would not be subject to the requirements of EJ. Issuance of a COE individual CWA 404 permit or SMCRA permit in Tennessee would require an EJ review prior to issuance.

To the extent that low-income populations are prevalent in the coalfields, the impacts of mountaintop mining are felt disproportionately by these environmental justice populations. The most notable impacts to be felt by coalfield residents are the operational disturbances, particularly blasting. For example, blasting can be particularly problematic for low-income persons, because they tend to live in substandard or non-traditional housing and may utilize poorly constructed water wells as their drinking water source. As indicated in the blasting studies, such structures may be more vulnerable to damage by blasting vibrations lower than levels that would affect structures built to modern standards [Appendix G.]. However, SMCRA blasting regulations provide for lowering performance standards to account for these circumstances.

Confirming the presence of an environmental justice population is a site-specific exercise that can only be done once an operator submits an application for an individual federally-issued CWA or SMCRA permit. It should be noted that the decision to mine coal is based on a number of factors such as the geologic location of minable coal deposits. Thus, as a review of the mine feasibility evaluation and planning factors described in Chapter III.L. indicates, the ability to mine in a particular location is an economic one and there is no reason to believe the presence or absence of an environmental justice (or any other segment of the) population affects the decision to mine.

In the context of this EIS as a Federal action and compliance with the EJ requirements, the Federal agencies have focused attention on human health and environmental conditions in the communities that may be affected by mountaintop mining activities. Issues or impacts that may disproportionately impact low-income populations in the EIS area are identified as "significant" issues for purposes of NEPA in Chapter II.A. The public participation process associated with this EIS has been quite exhaustive, as described in Chapter I.D. With the preparation and completion of this document and availability for review and comment by the public, the Federal action agencies have complied with the requirements of the EJ Executive Order.

As for individual mining activities that are proposed under either SMCRA and/or CWA regulatory authorities, residents and communities located near proposed mine sites may feel that efforts to make them aware of a proposed mine are insufficient; that they are not provided adequate opportunity to participate in the permit process; or that if aggrieved by a mining operation, the complaint process is too challenging and intimidating. However, both SMCRA and the CWA have established numerous opportunities to make the public aware of proposed mining and potential impacts to human health and the environment and to solicit input from interested parties. Notices are mailed to local officials, agencies, utilities, etc. when a mine is proposed. The proposed permit application is made available for review by the public at a place accessible to the public. SMCRA requires ads in the local newspaper weekly for four consecutive weeks advising the public of the proposed project, where and when the application is available for review, and where to send comments and/or request a public meeting on the proposed permit. Ads may again be placed in newspapers or other means of public notification when CWA permits are issued under Section 404 (fills) and Section 402 (effluent/basin discharges). An ad is placed in the local newspaper again before any blasting is to occur. Blasting notifications are mailed to everyone living within ½ mile of a mine site if blasting is proposed. If a NEPA document for a federal action is required, the public is advised of the preparation of the document in accordance with established NEPA regulations. The action agencies find that these notifications are more than adequate to notify the public of proposed mining, advise the public of potential impacts, solicit input from those potentially affected, and comply with the both the requirements and the spirit of the environmental justice executive order.

Although no statutory basis exists in either SMCRA or the CWA to base permitting decisions (i.e., approvals or denials) on EJ issues, proposed issuance of a federal permit requires the action agency to comply with the goals of the EJ executive order. Under the EO, an agency must: (1) focus federal agency attention on human health and environmental conditions in EJ communities, (2) foster non-discrimination in federal programs and actions that substantially affect these populations/ communities, and (3) give the EJ populations/communities greater participation opportunities and greater access to public information on matters of public health and the environment. Under NEPA, if disproportionate impacts on minority or low-income populations are identified, a proposed action is not precluded from going forward, nor does it compel a conclusion that the action is environmentally unsatisfactory. Rather, identification of such an effect should heighten agency attention to alternatives, mitigation measures, monitoring needs, and preferences expressed by the affected communities or populations (CEQ, 1997).

In December 1, 2000, the EPA Office of General Counsel stated in a memorandum regarding the EO on EJ: "...there are several CWA authorities under which EPA could address environmental justice issues in permitting." EPA Adminstrator Christie Whitman concurred and reinforced this statement in a memorandum dated August 9, 2001: "Environmental statutes provide many opportunities to address environmental risks and hazards in minority communities and/or low-income communities. Application of these existing statutory provisions is an important part of this agency's effort to prevent those communities from being subject to disproportionately high and adverse impacts, and environmental effects."

The federal action agencies comply with the requirements and the spirit of the EJ executive order both in the development of this EIS document and in the implementation of the federal programs to regulate mountaintop mining activities. The processes in place both for the development of this document and for the processing of permit applications by federal agencies provide the mechanisms to identify the concerns of the public, including EJ populations, and provide numerous opportunities for their participation in the decision-making process. As such, none of the alternatives include any new or revised process-related actions that are specifically directed at the identification and participation of EJ populations in the federal agency decision-making process.